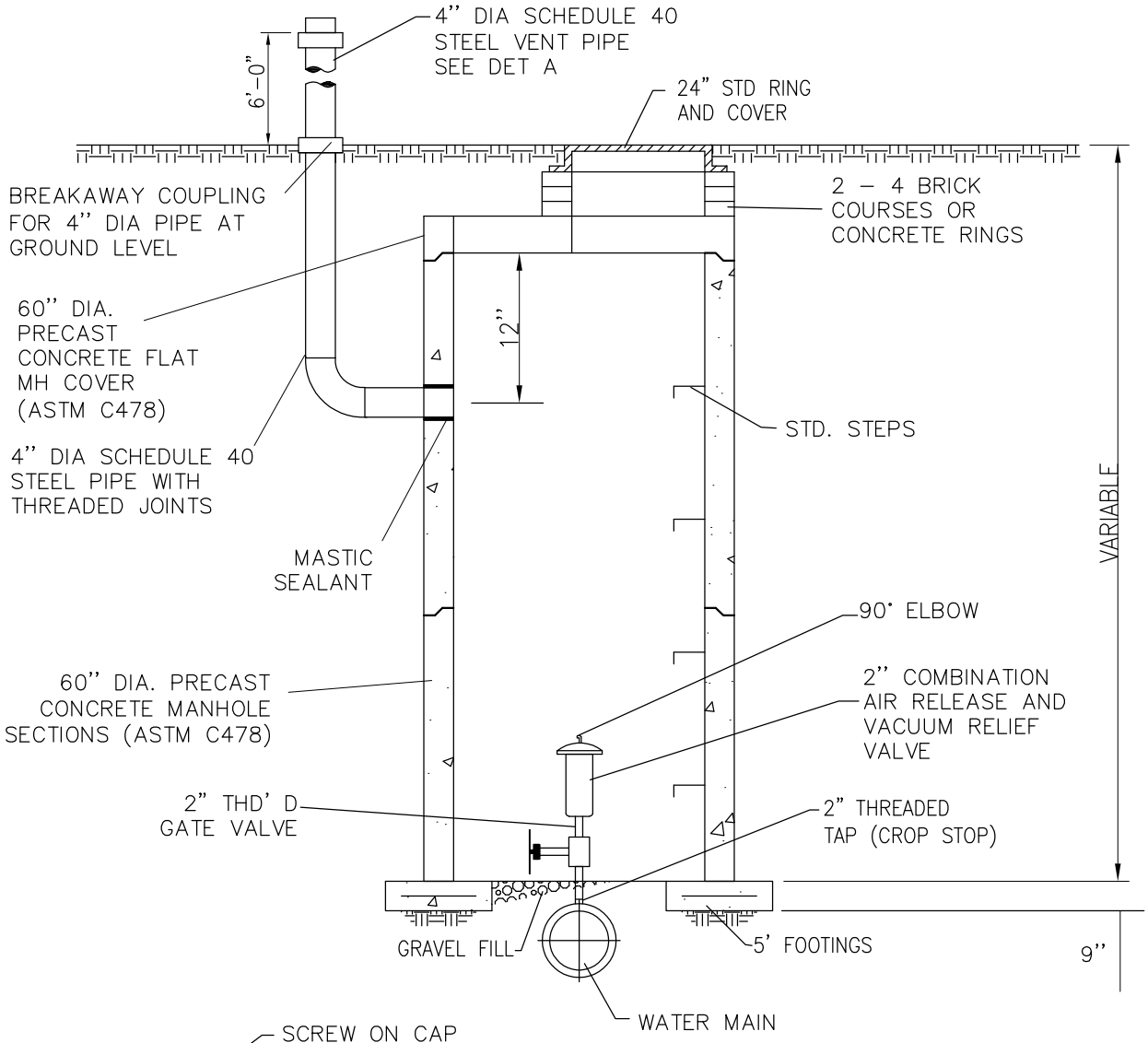
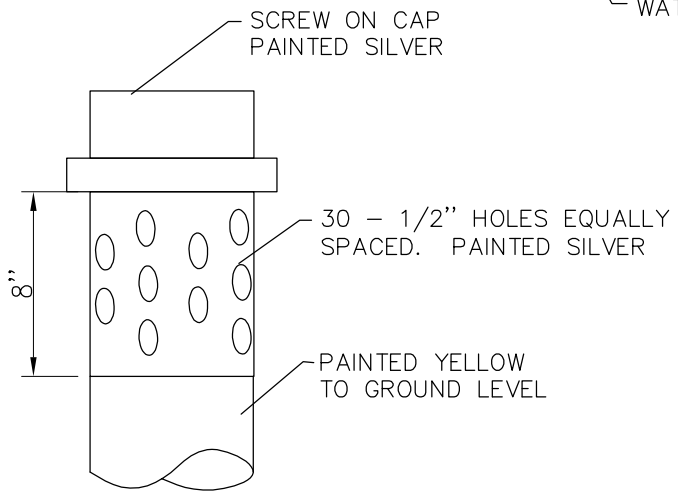
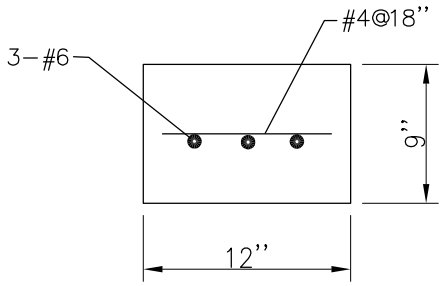




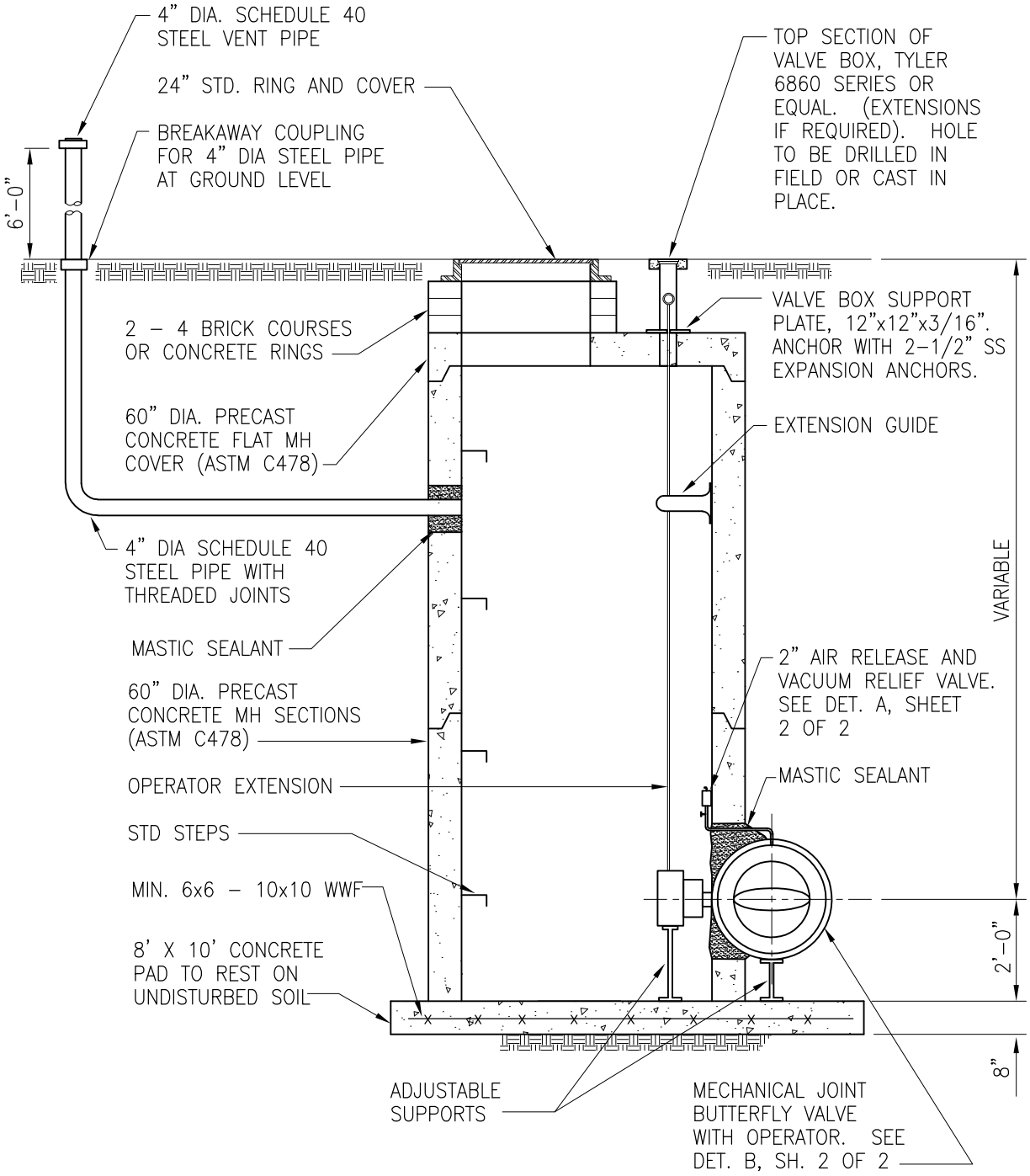
DETAIL A



FOOTING DETAIL

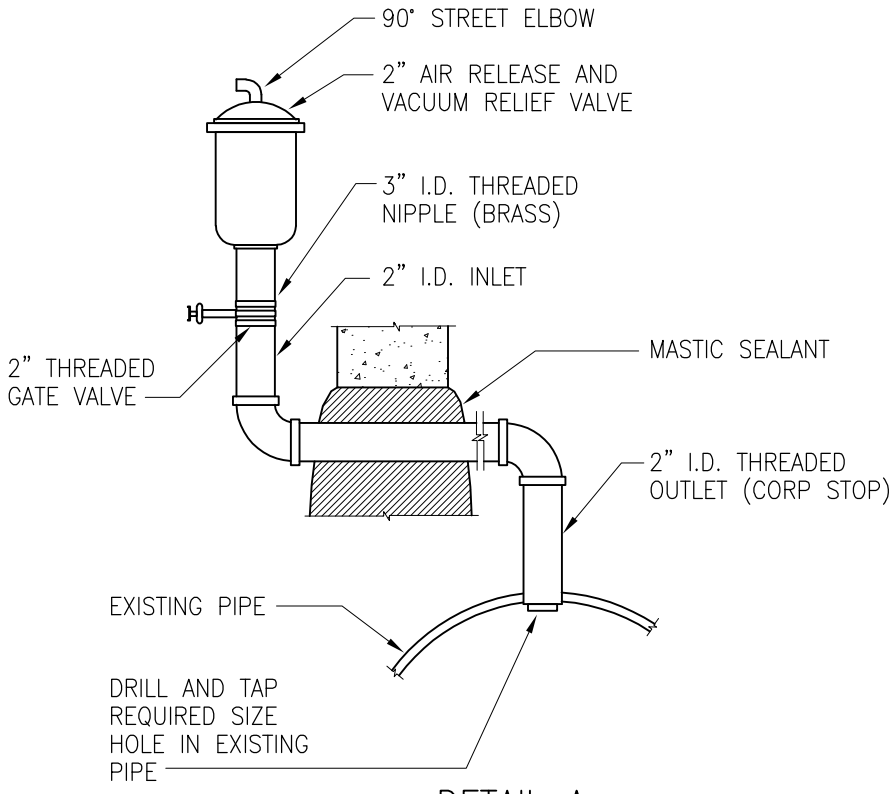
NOTE: ALL METAL SURFACES SHALL BE COATED WITH TWO COATS OF HEAVY COAL TAR PAINT.

	STANDARDS & SPECIFICATIONS	REVISED:	AIR RELEASE AND VACUUM RELIEF VALVE
DATE:		DRAWING NO. 200-01	

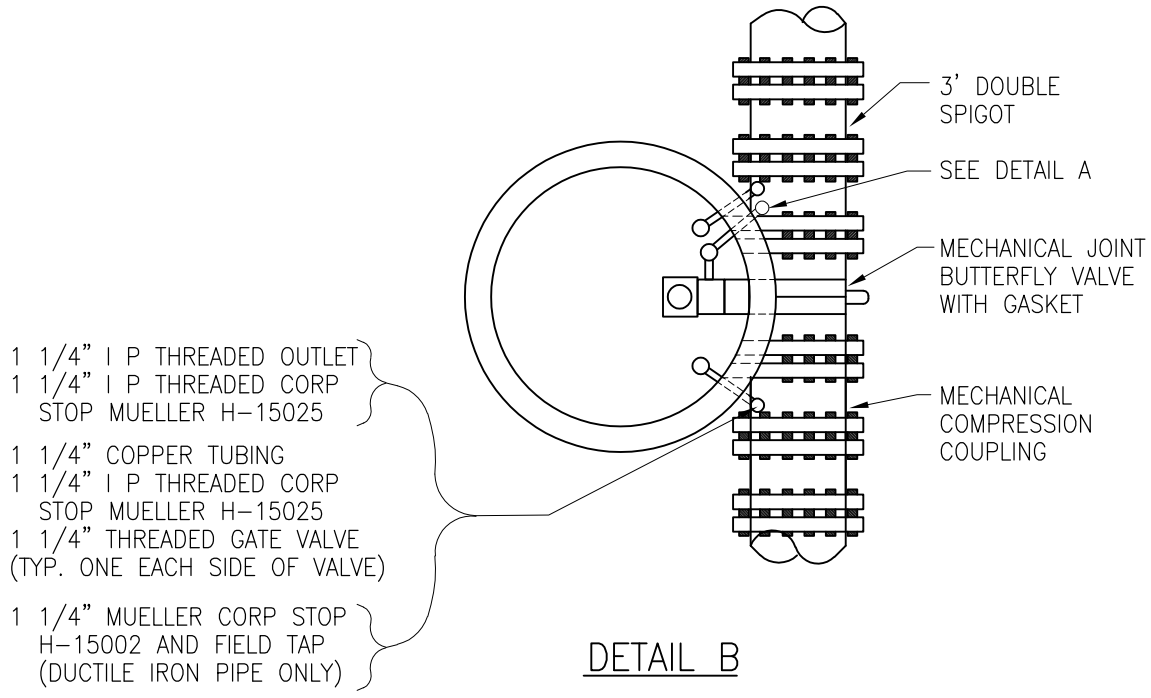


ELEVATION

	STANDARDS & SPECIFICATIONS	REVISED:	**BUTTERFLY VALVE**
DATE:		DRAWING NO. 200-02	

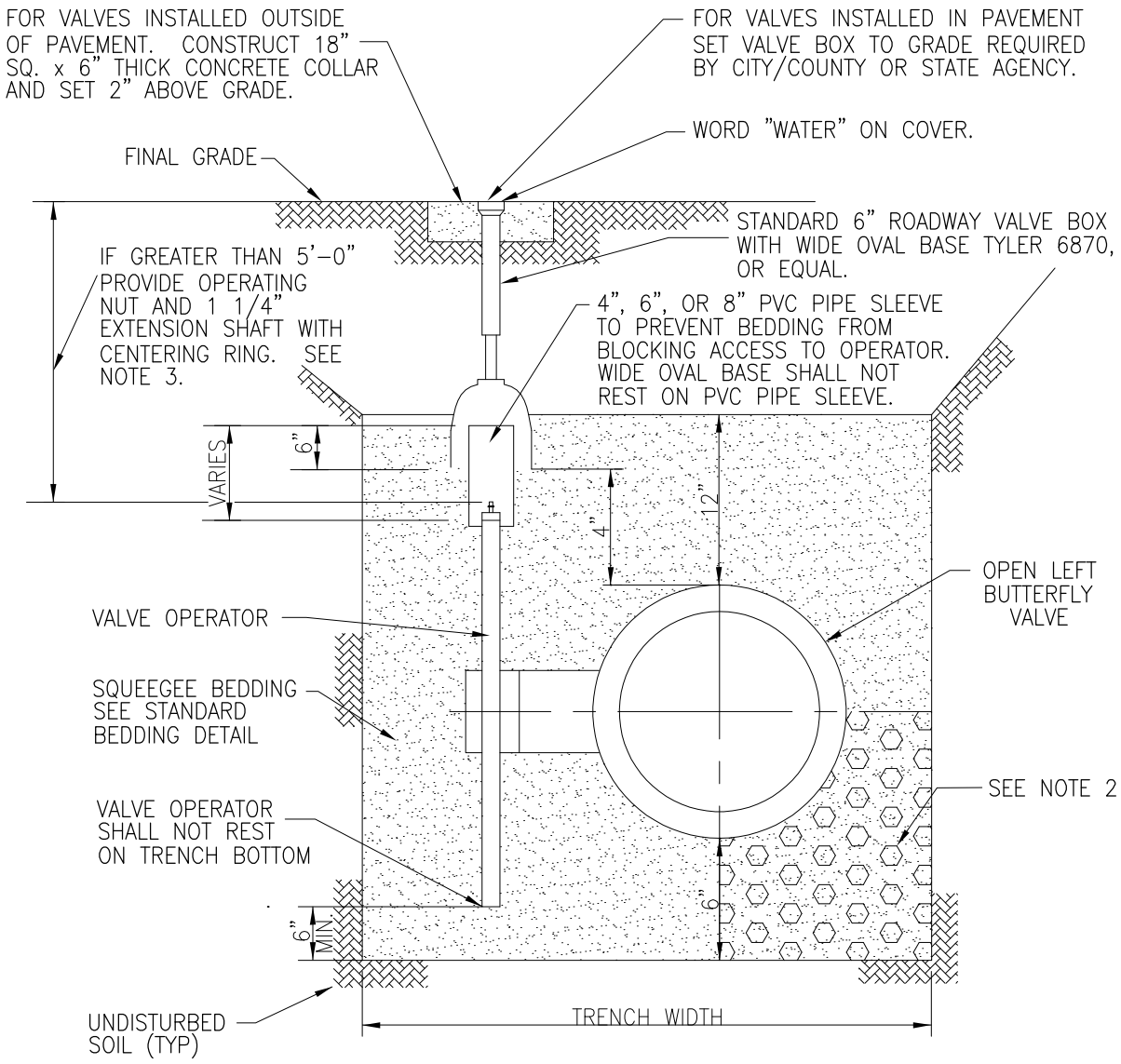


DETAIL A



DETAIL B

	STANDARDS & SPECIFICATIONS	REVISED:	BUTTERFLY VALVE
DATE:		DRAWING NO. 200-03	

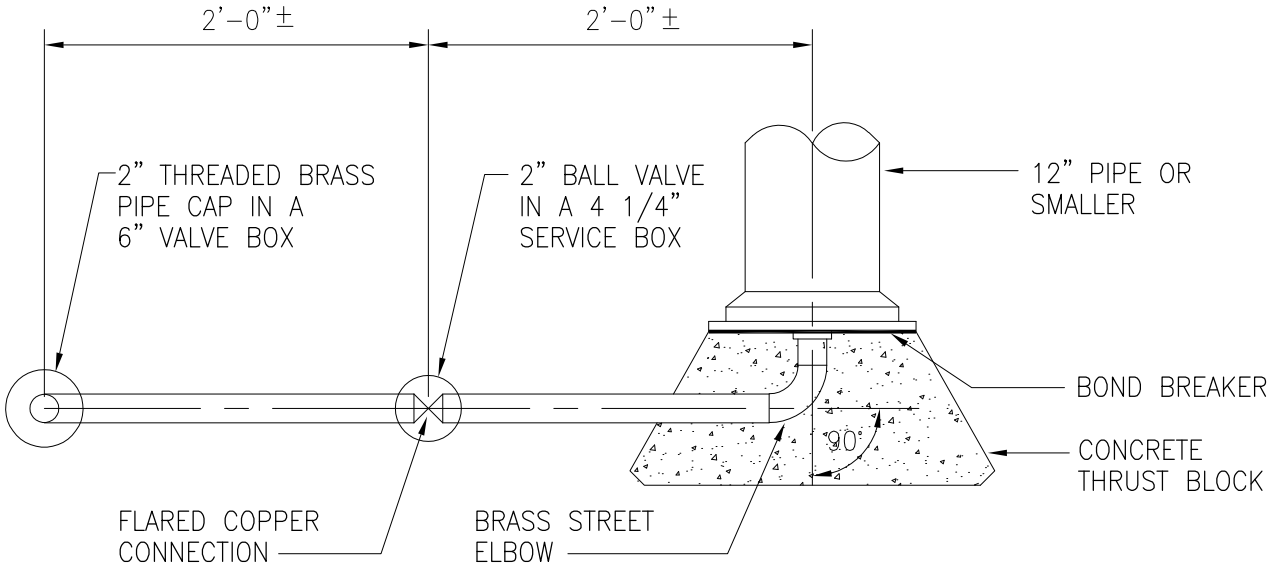


NOT TO SCALE

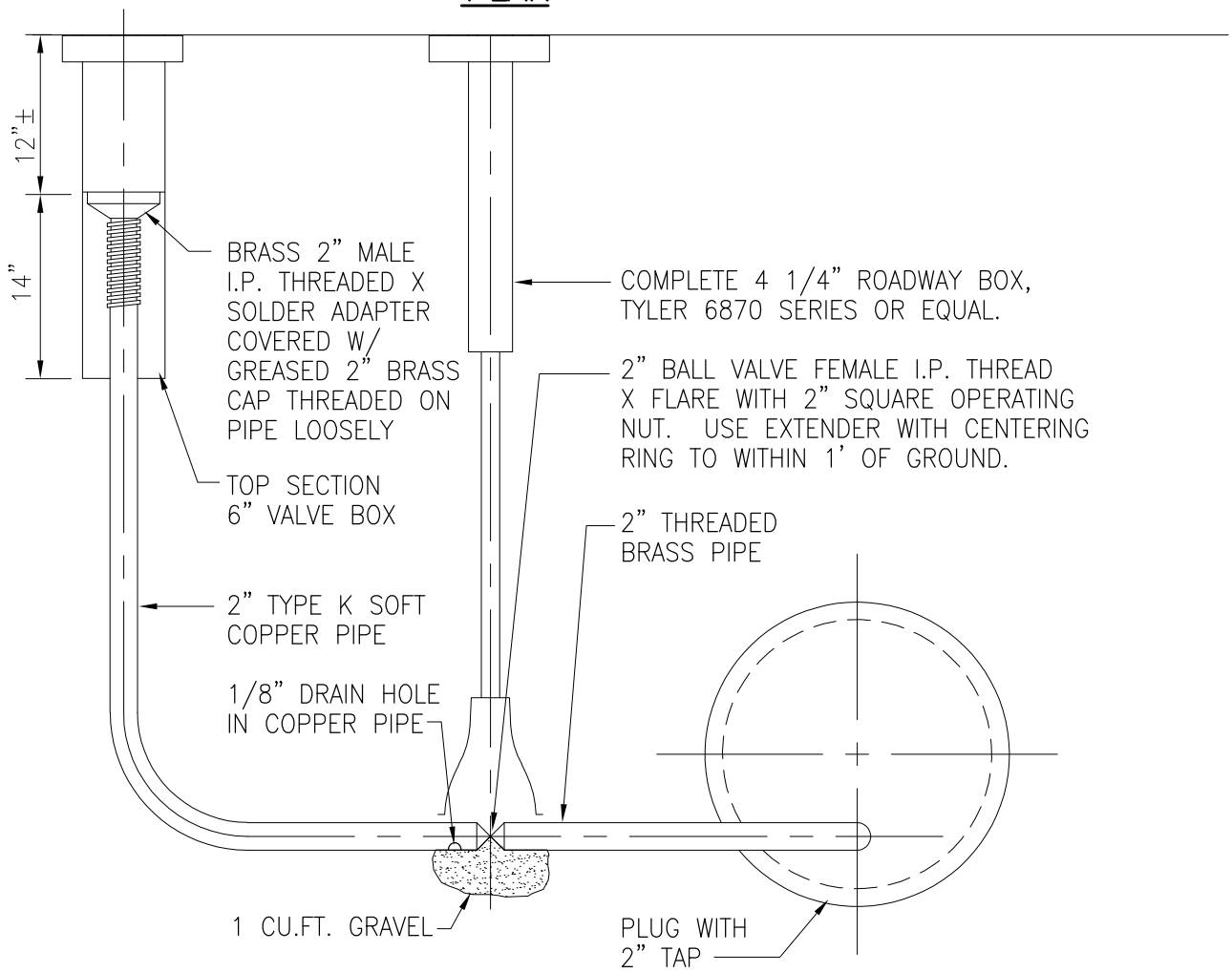
NOTES:

1. THIS DETAIL IS FOR BUTTERFLY VALVE INSTALLATIONS 20-INCHES IN DIAMETER OR SMALLER.
2. CARE SHALL BE TAKEN WHEN INSTALLING VALVES TO ASSURE PROPER SUPPORT OF THE VALVE. THE AUTHORITY MAY REQUIRE 3/4" CRUSHED ROCK TO BE INSTALLED UNDER THE VALVE TO PROVIDE PROPER SUPPORT.
3. VALVES SHALL NOT BE PLACED IN CONCRETE CROSS PANS.
4. OPERATING NUTS SHALL NOT BE SET CLOSER THAN THREE (3) FEET TO FINAL GRADE OR DEEPER THAN FIVE (5) FEET FROM FINAL GRADE. OPERATOR EXTENSIONS SHALL BE CONNECTED TO VALVE OPERATOR USING SET SCREW.
5. BUTTERFLY VALVE AND OPERATOR SHALL BE POLYETHYLENE WRAPPED.

	STANDARDS & SPECIFICATIONS	REVISED:	**BUTTERFLY VALVE DIRECT BURY**
DATE:	DRAWING NO. 200-04		

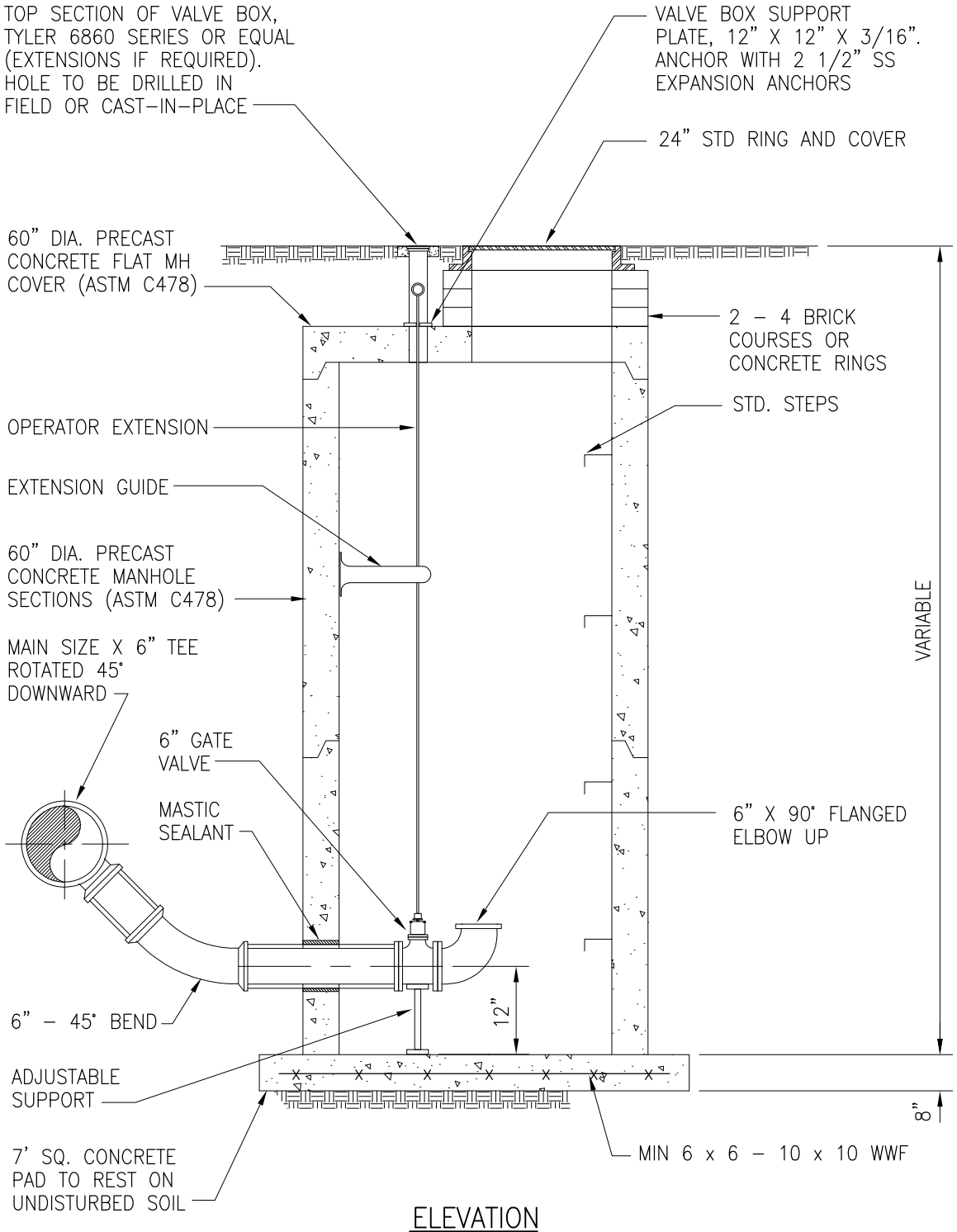


PLAN



ELEVATION

	STANDARDS & SPECIFICATIONS	REVISED:	BLOW-OFF VALVE 12 " AND SMALLER PIPE
DATE:		DRAWING NO. 200-05	

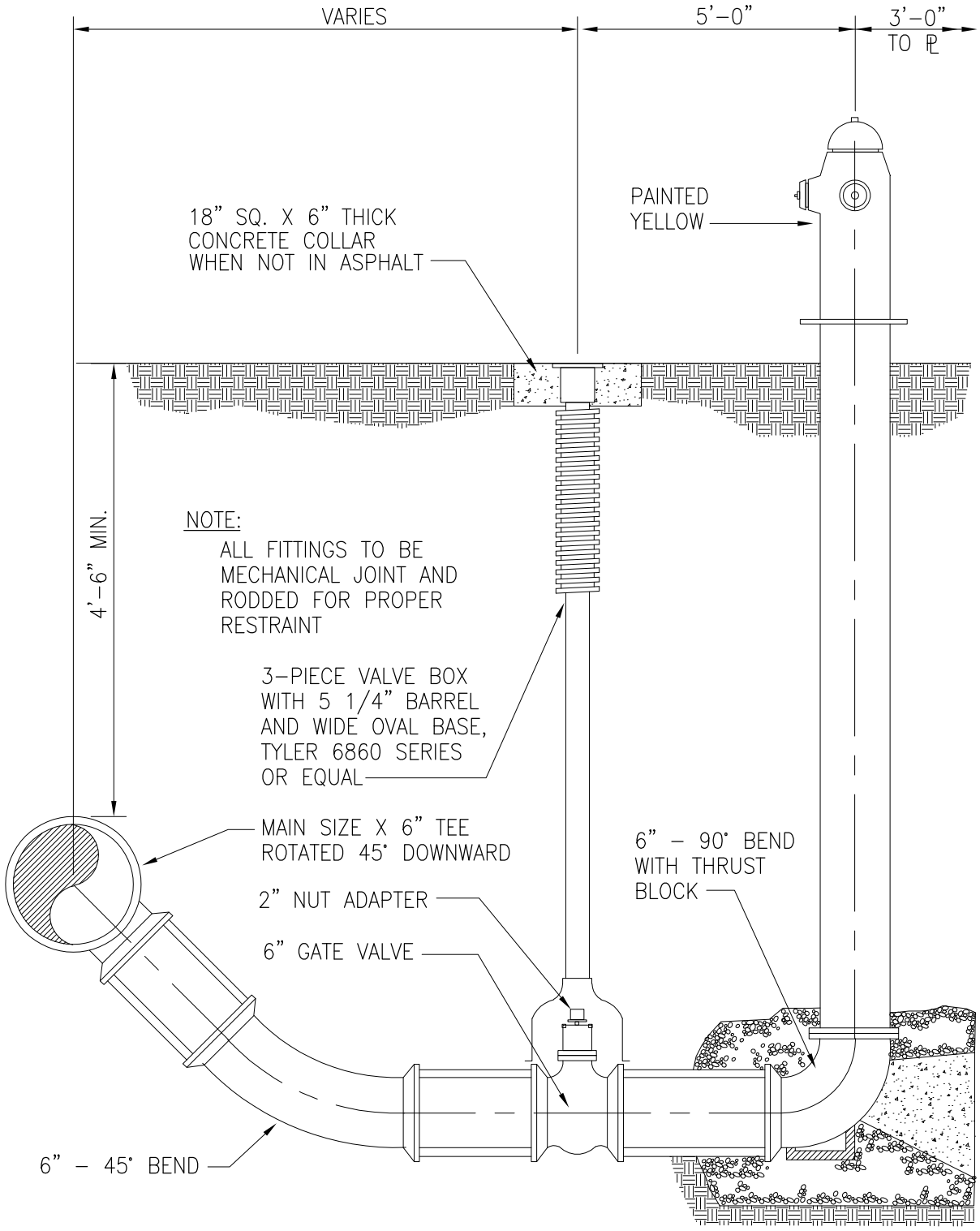


ELEVATION

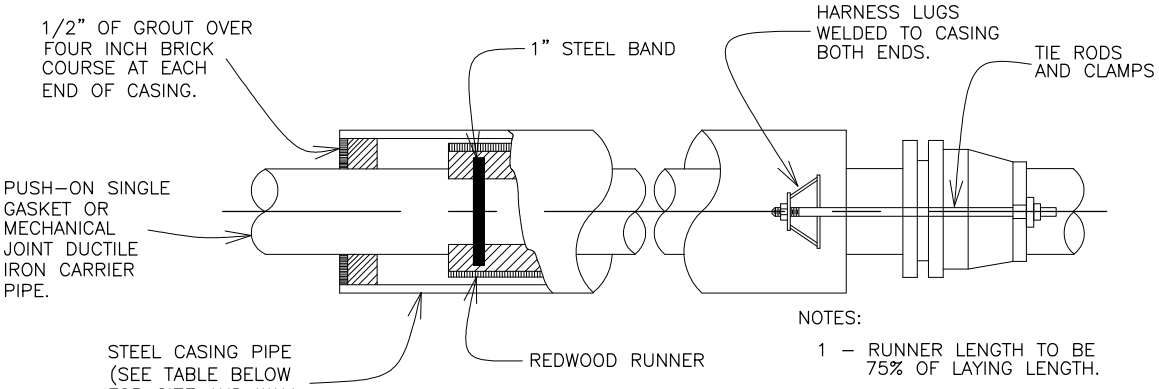
NOTES:

1. FIRE HYDRANT MAY BE USED AS AN ALTERNATE BLOW-OFF. SEE DETAIL.
2. ALL METAL SURFACES SHALL BE COATED WITH TWO COATS OF HEAVY COAL TAR PAINT.

	STANDARDS & SPECIFICATIONS	REVISED:	BLOW-OFF VALVE 16" + LARGER MAINS
DATE:		DRAWING NO. 200-06	



	STANDARDS & SPECIFICATIONS	REVISED:	BLOW-OFF VALVE FIRE HYDRANT ALTERNATE
DATE:		DRAWING NO. 200-07	



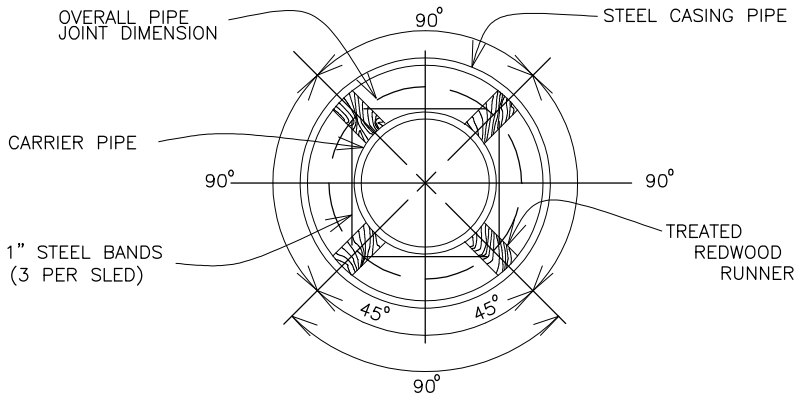
SLED DETAIL

NOTES:

1 – RUNNER LENGTH TO BE 75% OF LAYING LENGTH.

2 – CASING LENGTH IS MIN. OF 18 FEET. CONCRETE ENCASEMENT OF SEWER SHALL EXTEND A DISTANCE OF 10 FEET HORIZONTALLY AND PERPENDICULAR TO EITHER SIDE OF THE WATER MAIN.

3 – HARNESS LUGS TO BE INSULATED FROM D.I. PIPE.



PIPE CASING DETAIL

CARRIER PIPE NOMINAL DIA.	CASING PIPE		MINIMUM RUNNER SIZE
	MIN. O.D.	MIN. WALL THICK	
4"	12"	0.188"	2" x 4"
6"	16"	0.250"	2" x 4"
8"	18"	0.282"	2" x 4"
12"	22"	0.344"	2" x 4"
16"	28"	0.406"	2" x 6"
20"	32"	0.469"	2" x 6"

NOTES:

1.) NEOPRENE OR PVC RUNNERS MAY BE USED AS AN ALTERNATIVE TO TREATED REDWOOD.

2.) TRENCH LAID CASINGS SHALL BE DESIGNED AND INSTALLED TO CONDUIT STANDARDS.

	STANDARDS & SPECIFICATIONS	REVISED:	BORE CASING DETAIL
DATE:		DRAWING NO. 200-08	

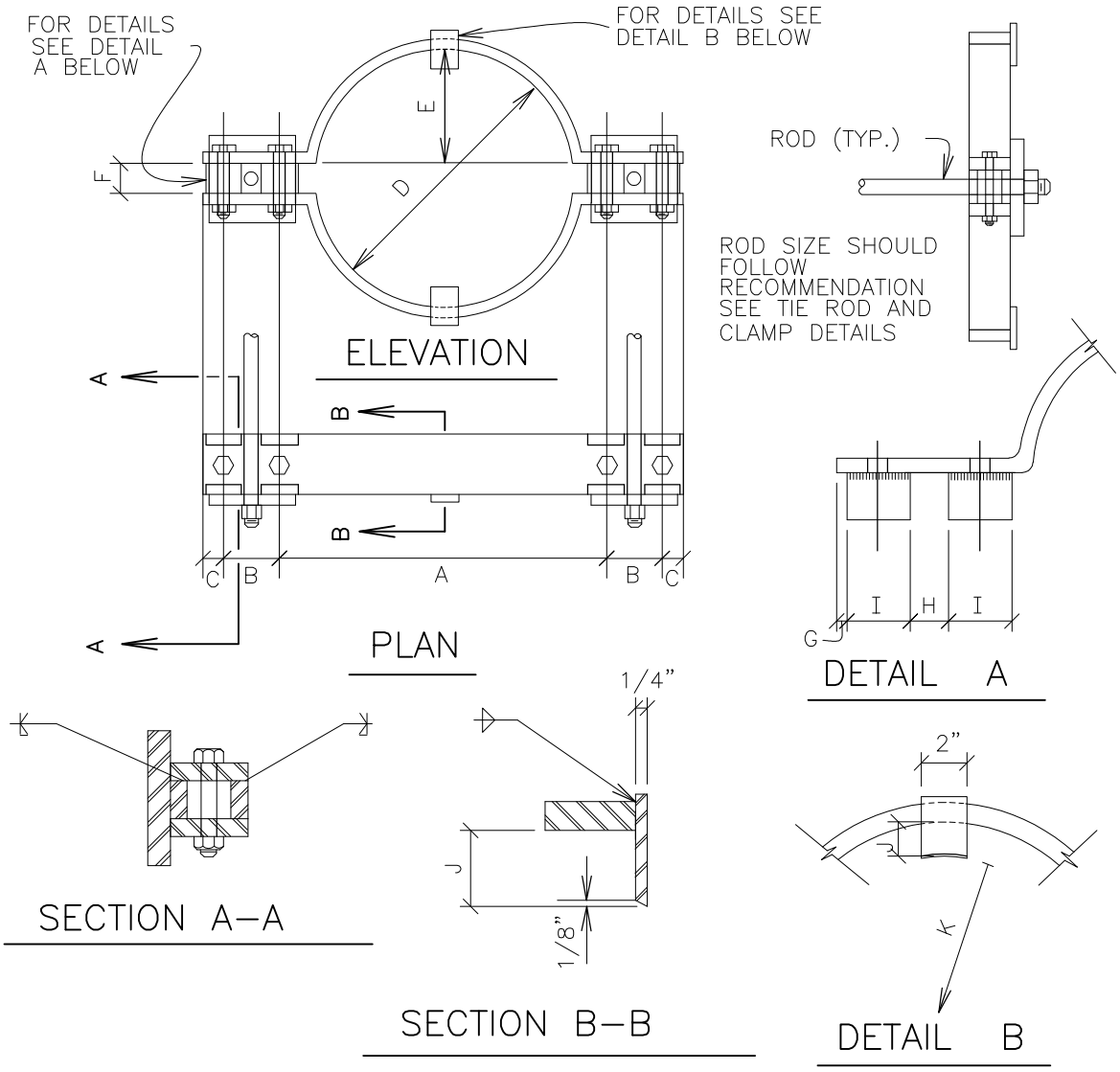


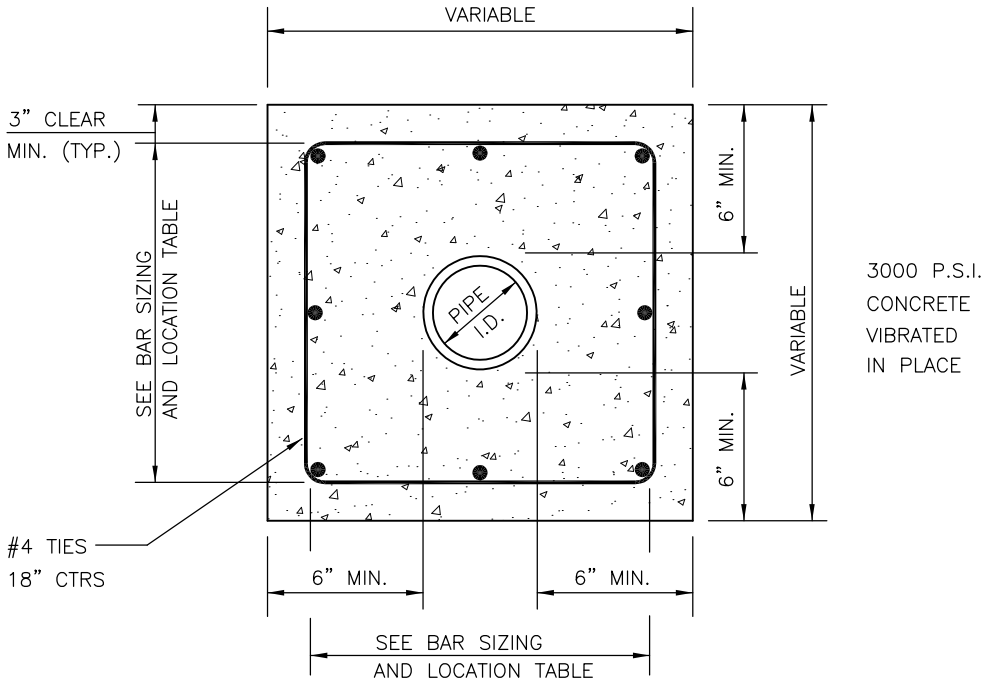
TABLE OF DIMENSIONS FOR CLAMPS

PIPE DIAMETER	BAR SIZE	A		B		C		D		E		F		G		H		I		J	K	BOLT SIZE		PIPE DIAMETER
		BELL CLAMP	BODY CLAMP	BELL CLAMP	BODY CLAMP	BELL CLAMP	BODY CLAMP	BELL CLAMP	BODY CLAMP	BELL CLAMP	BODY CLAMP	BELL CLAMP	BODY CLAMP	BELL CLAMP	BODY CLAMP	BELL CLAMP	BODY CLAMP	BELL CLAMP	BODY CLAMP	BELL CLAMP	BELL CLAMP	BELL CLAMP	BODY CLAMP	
4	1-1/2 x 1/2	9	7-3/8	3	4	1-1/2	1-1/2	6-1/4	4-3/4	2-5/8	1-7/8			3/8	3/8	1-1/4	1-1/4	2-1/4	2-1/2	5/8	2-1/2	3 x 1-1/2	2-1/2 x 3/8	4
6	2 x 1/2	11-1/4	9-5/8	3	4	1-1/2	1-1/2	8-1/2	6-7/8	3-3/4	2-15/16							2-1/4	2-1/2	1/2	3-3/4	3-1/2 x 1/2	3-1/2 x 1/2	6
8	2-1/2 x 1/2	13-5/8	11-7/8	3-1/2	4	1-1/2	1-1/2	10-3/4	9-1/8	4-7/8	4-1/6							2-1/4	2-1/2	5/8	4-3/4	4-1/2 x 1/2	4 x 1/2	8
12	2-1/2 x 5/8	18-1/4	16-3/8	3-1/2	4	1-1/2	1-1/2	15-1/8	13-1/4	7-1/16	6-1/8							2-1/4	2-1/2	13/16	6-3/4	4-1/2 x 5/8	4-1/2 x 5/8	12
16	3 x 3/4	23-1/8	20-5/8	4	4-1/2	1-1/2	1-1/2	19-3/4	17-3/8	9-1/4	8-1/16	1-1/4	1-1/4	1/4	1/4	1-1/2	1-1/2	2-1/4	2-3/4	15/16	8-15/16	5-1/2 x 5/8	5-1/2 x 5/8	16
20	3 x 3/4	27-1/2	25	4	4-1/2	1-1/2	1-1/2	24-1/8	21-5/8	11-5/16	10-1/16	1-1/2	1-1/2	3/8	3/8	1-3/4	1-3/4	2-1/4	2-1/2	1	11-1/16	5-1/2 x 5/8	5-1/2 x 5/8	20
24	RODS AND CLAMPS NOT ALLOWED.																							24

NOTE: ALL DIMENSIONS IN INCHES.

NOTE: NOT FOR USE WITH 18" & 20" D.I. COMPACT FITTINGS.

	STANDARDS & SPECIFICATIONS	REVISED:
DATE:	DRAWING NO. 200–09	CLAMP DETAIL



PIPE SIZE	NO. OF LONGITUDINAL BARS AND LOCATION	
6"	4 – NO. 4 BARS	1 EACH CORNER
8"	4 – NO. 4 BARS	1 EACH CORNER
10"	8 – NO. 4 BARS	3 EACH SIDE
12"	8 – NO. 4 BARS	3 EACH SIDE
15"	8 – NO. 4 BARS	3 EACH SIDE
18"	8 – NO. 4 BARS	3 EACH SIDE
21"	12 – NO. 4 BARS	4 EACH SIDE
24"	12 – NO. 4 BARS	4 EACH SIDE
27"	12 – NO. 4 BARS	4 EACH SIDE
30"	12 – NO. 4 BARS	4 EACH SIDE
33"	12 – NO. 4 BARS	4 EACH SIDE
36"	16 – NO. 4 BARS	5 EACH SIDE

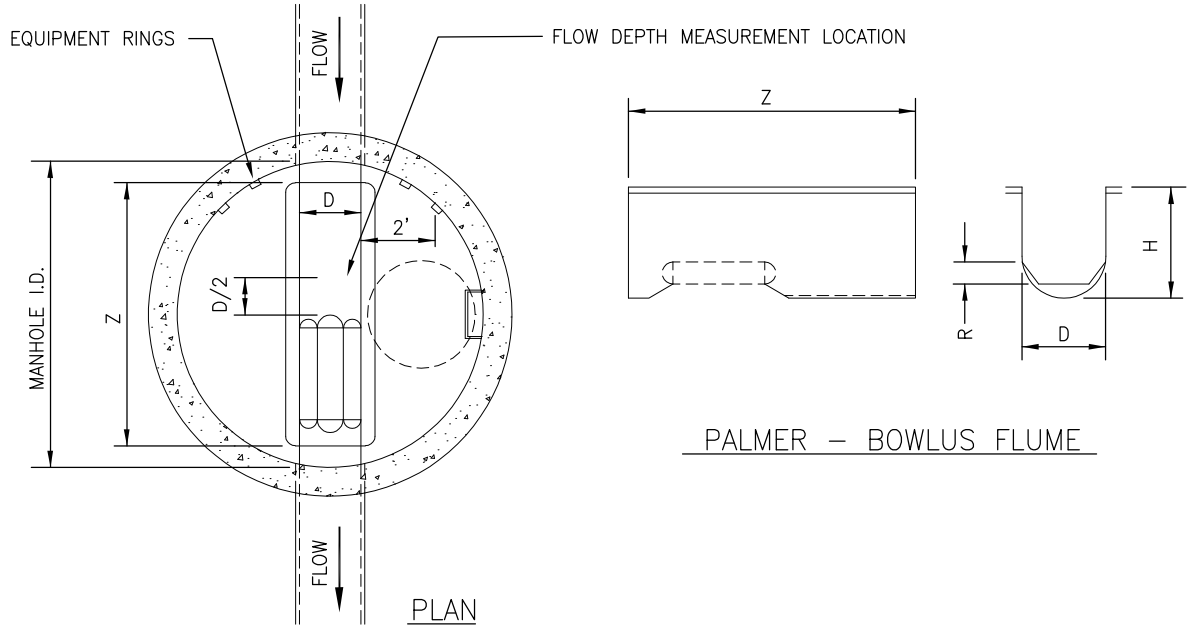
STANDARDS & SPECIFICATIONS

REVISED:

DATE:

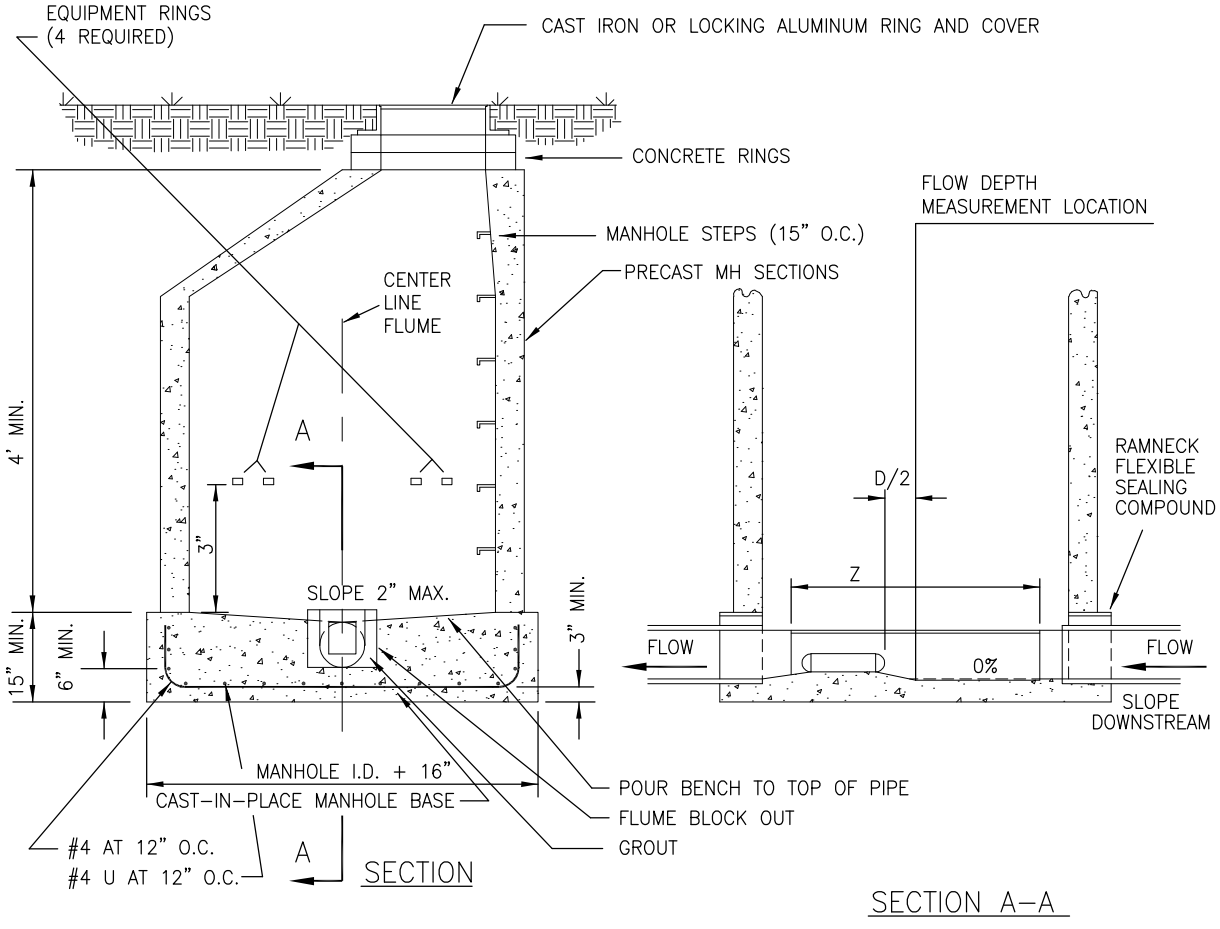
DRAWING NO. 200–10

CONCRETE ENCASEMENT



PLAN

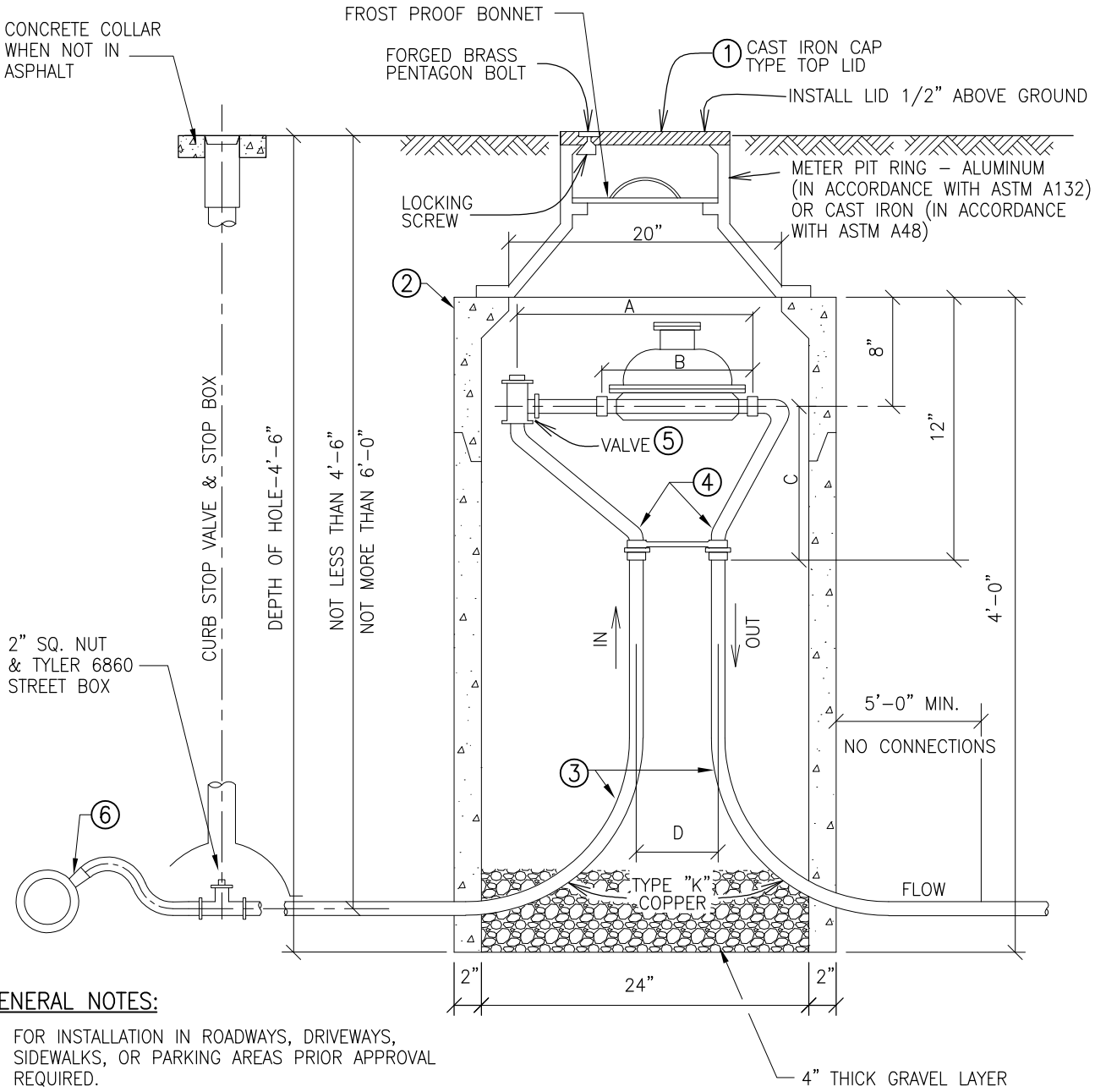
PALMER – BOWLUS FLUME



SECTION

SECTION A–A

	STANDARDS & SPECIFICATIONS	REVISED:	WASTE METERING AND SAMPLING
DATE:		DRAWING NO. 200–11	



GENERAL NOTES:

1. FOR INSTALLATION IN ROADWAYS, DRIVEWAYS, SIDEWALKS, OR PARKING AREAS PRIOR APPROVAL REQUIRED.
2. NO CONCRETE FLOOR ALLOWED IN METER PIT.
3. METER PIT SHALL BE CONSTRUCTED OF ANY COMBINATION OF CONCRETE RINGS TOTAL – 48" IN LENGTH.
4. ADJUSTMENT RINGS SHALL BE 2", 3", 4" OR 6" IN HEIGHT AND SHALL BE INSERTED BETWEEN THE DOME AND TOP RING.
5. NO CONNECTIONS OR CHANGES IN PIPE DIAMETER SHALL BE MADE FROM THE MAIN TAP TO A DISTANCE OF FIVE FEET BEYOND THE METER PIT WALL ON THE OUTLET SIDE.
6. LID SHALL SAY "WATER METER"

METER SIZE	A	B	C	D
5/8"x 3/4"	12–5/8"	7–13/16"	7–13/16"	4"
3/4"	14–1/4"	9–5/16"	8–15/16"	5"
1"	17–1/4"	11–1/16"	11–1/4"	6"

STANDARDS & SPECIFICATIONS

REVISED:

DATE:

DRAWING NO. 200–12

OUTSIDE SETTING 1" METERS AND BELOW

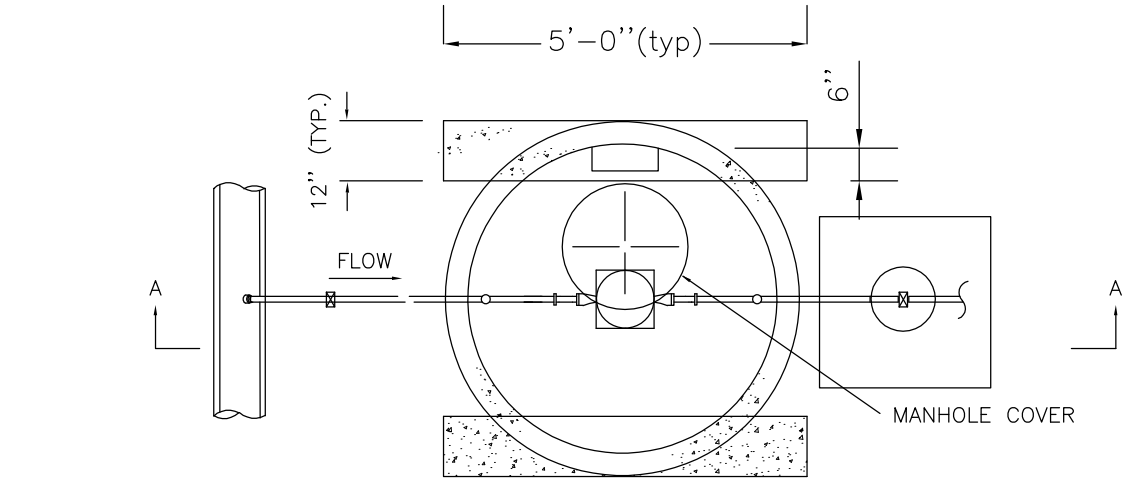
LIST OF MATERIALS

1. RING AND COVER – J'MARK NO. J–2290 (81 LBS.) OR APPROVED EQUAL WITH INTERNAL FROST LID.
2. METER PIT – ARCO NO. 24–4 PRECAST MANHOLE (24" DIA.) OR APPROVED EQUAL.
3. SERVICE LINE – COPPER TUBING TYPE K, SAME DIAMETER AS THE METER.
4. METER YOKE ASSEMBLY – FORD 80 SERIES COPPER SETTER OR APPROVED EQUAL.
5. SHUT–OFF VALVE.
6. CORPORATION STOP. A SADDLE MAY BE REQUIRED.

ADDITIONAL NOTES

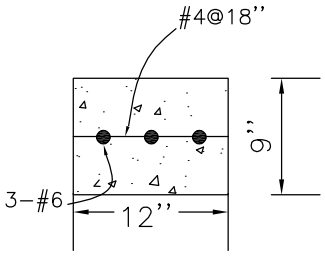
1. THE AUTHORITY SHALL INSPECT FROM THE MAIN TO THE BUILDING PRIOR TO BACKFILLING.
2. IF THE SURFACE IS NOT TO FINAL GRADE AT THE TIME OF THE METER INSTALLATION, THE PROPERTY OWNER SHALL RAISE OR LOWER THE METER PIT ACCESS MANHOLE TO MATCH THE FINAL GRADE.
3. THE METER SHALL BE A POSITIVE DISPLACEMENT ROCKWELL OR NEPTUNE TRIDENT 8, READING IN GALLONS.
4. CAP TYPE TOP LID SHALL BE CAST IRON ONLY. THE INNER LID SHALL BE CAST IRON, ALUMINUM OR RUBBER. THE ALUMINUM SHALL BE COATED WITH A POLYMER SUCH AS EPOXY. CAST IRON SHALL BE COATED WITH AN ASPHALT BASE PAINT.

	STANDARDS & SPECIFICATIONS	REVISED:	OUTSIDE SETTING 1' METERS AND BELOW
DATE:	DRAWING NO. 200–13		



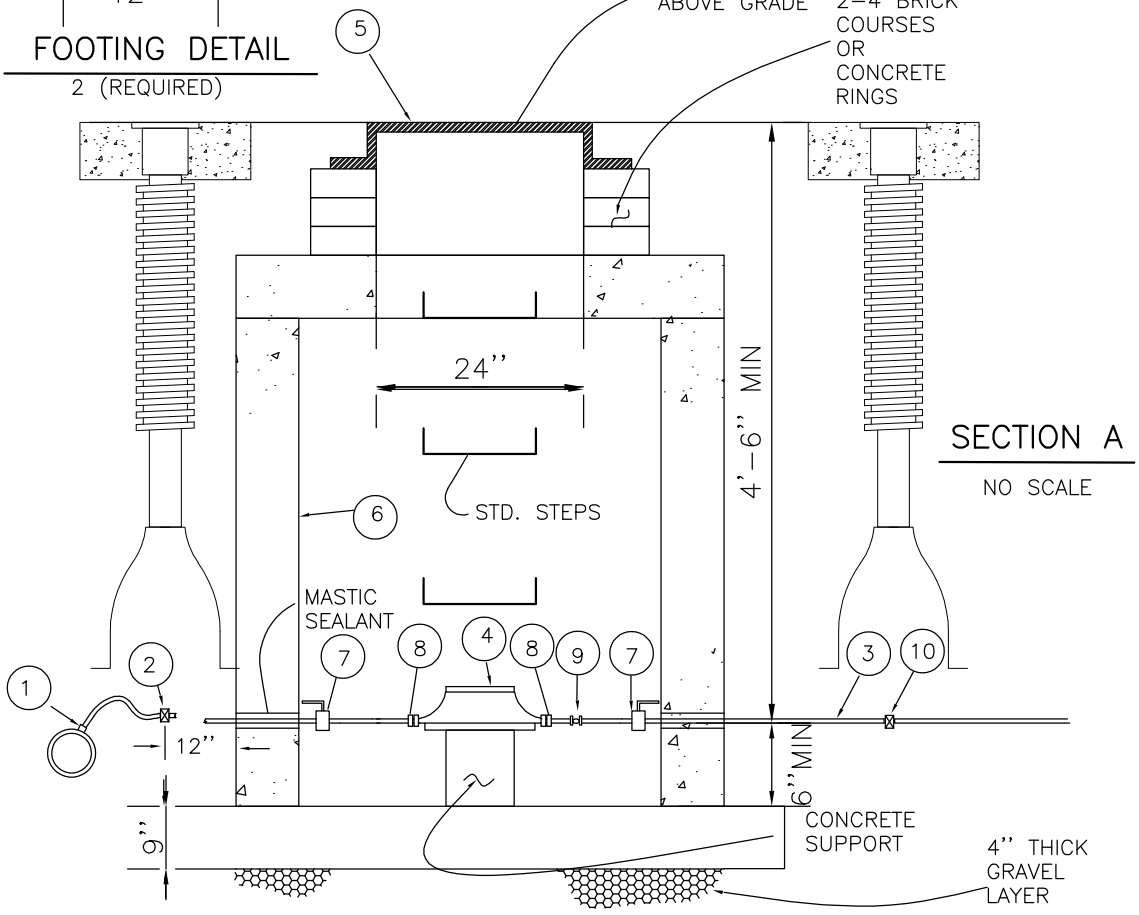
SECTIONAL PLAN

NO SCALE



FOOTING DETAIL

2 (REQUIRED)



SECTION A

NO SCALE

STANDARDS & SPECIFICATIONS	REVISED:	DOMESTIC METER PIT PRESSURE REDUCING 1-1/2" AND UP
DATE:	DRAWING NO. 200-14	

LIST OF MATERIALS

1. CORPORATION STOP VALVE.
2. CURB STOP VALVE AND BOX W/ 2" OPERATOR NUT AND FLARED COPPER ENDS. CURB STOP VALVE BOX MUST BE A 3–PIECE BOX WITH 5–1/4" BARREL AND WIDE OVAL BASE (TYLER 6860 SERIES, OR APPROVED EQUAL).
3. SERVICE LINE – COPPER TUBING TYPE K, SAME DIAMETER AS THE METER.
4. METER – POSITIVE DISPLACEMENT ROCKWELL OR NEPTUNE TRIDENT 8, READING IN GALLONS
5. RING AND COVER – J'MARK NO. J1163 (125 LBS. COVER) OR APPROVED WITH WATER CAST INTO COVER.
6. METER PIT – 48'' DIA. PRECAST MANHOLE ASTM C478, FLAT TOP.
7. BALL VALVE– FORD BALL VALVE CURB STOP W/ FEMALE THREAD IRON PIPE & FLARED COPPER ENDS OR EQUAL. (2 REQ.)
8. BRASS FLANGE COUPLING
9. FORD LOK–PAK ADJUSTMENT COUPLING W/2 STAINLESS STEEL SET SCREWS.
10. STOP & WASTE VALVE W/FLARED COPPER ENDS.

NOTES

1. THE DISTRICT SHALL INSPECT FROM THE MAIN TO THE BUILDING PRIOR TO BACKFILLING.
2. IF THE SURFACE IS NOT TO FINAL GRADE AT TIME OF THE METER INSTALLATION, THE PROPERTY OWNER SHALL RAISE OR LOWER THE METER PIT ACCESS MANHOLE TO MATCH THE FINAL GRADE.
3. COUPLINGS SHALL BE PROVIDED ON UPSTREAM AND DOWNSTREAM SIDES OF METER TO ALLOW FOR REMOVAL.
4. TOP STEP 18" – 24" BELOW THE SURFACE, REMAINDER SPACED AT 12" INTERVALS.

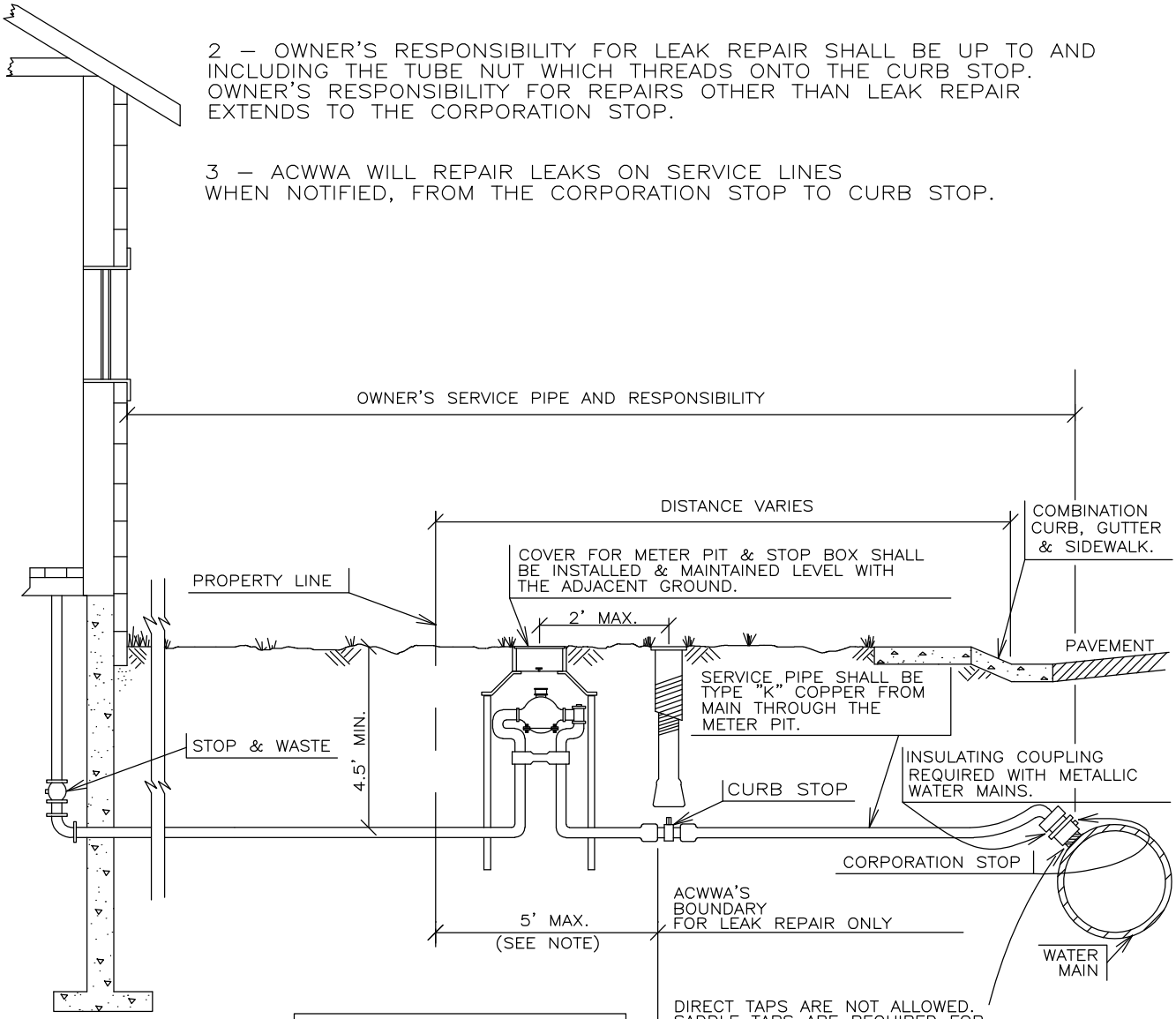
	STANDARDS & SPECIFICATIONS	REVISED:	DOMESTIC METER PIT PRESSURE REDUCING 1-1/2" AND UP
DATE:	DRAWING NO. 200–15		

NOTE:

1 – PLACEMENT OF STOP BOX CAN VARY FROM A MAXIMUM OF 5 FEET OUTSIDE THE PROPERTY LINE TO THE PROPERTY LINE. PLACEMENT OF THE STOP BOX OUTSIDE THE PROPERTY LINE IS PREFERRED.

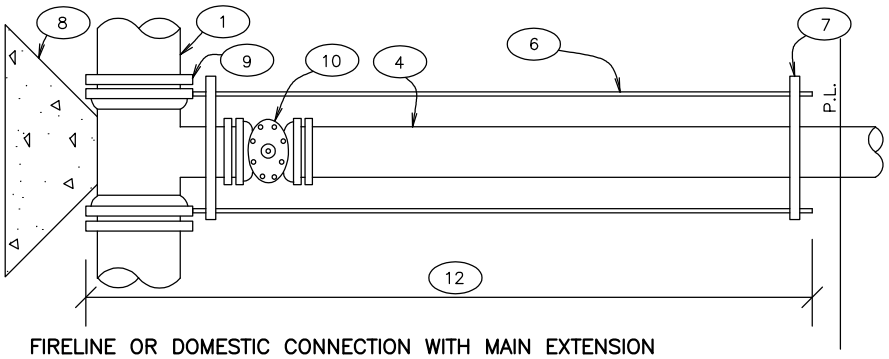
2 – OWNER'S RESPONSIBILITY FOR LEAK REPAIR SHALL BE UP TO AND INCLUDING THE TUBE NUT WHICH THREADS ONTO THE CURB STOP. OWNER'S RESPONSIBILITY FOR REPAIRS OTHER THAN LEAK REPAIR EXTENDS TO THE CORPORATION STOP.

3 – ACWWA WILL REPAIR LEAKS ON SERVICE LINES WHEN NOTIFIED, FROM THE CORPORATION STOP TO CURB STOP.

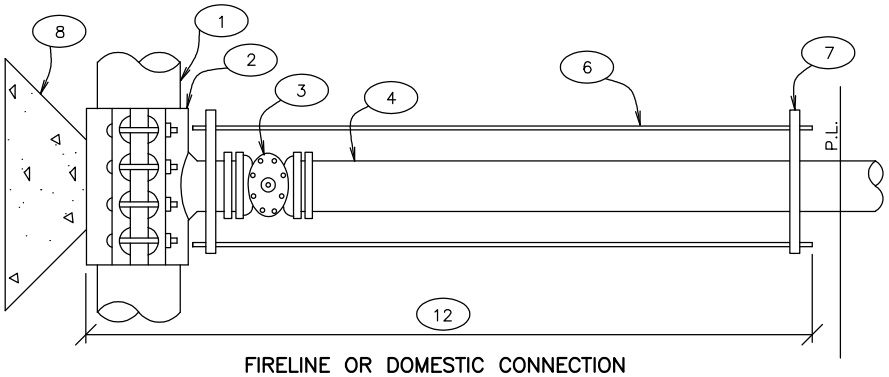


SHOULD ANY SITUATION ARISE OTHER THAN SHOWN CONCERNING THE DEPTH OR OBSTRUCTION OF SERVICE LINE OR THE PLACEMENT OF METER PIT OR STOP BOX CALL 303–790–4830 AND ASK FOR CUSTOMER SERVICES FIELD SECTION.

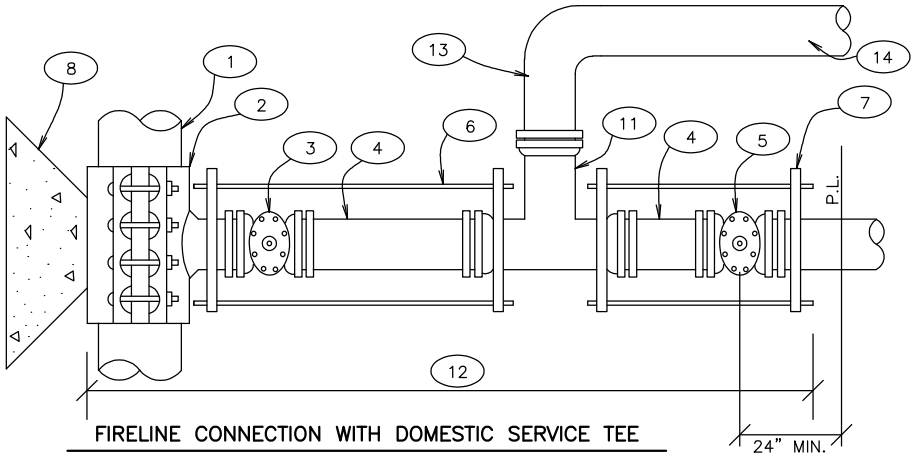
	STANDARDS & SPECIFICATIONS	REVISED:
DATE:	DRAWING NO. 200–16	DOMESTIC SERVICE OUTSIDE METER INSTALLATION



FIRELINE OR DOMESTIC CONNECTION WITH MAIN EXTENSION



FIRELINE OR DOMESTIC CONNECTION



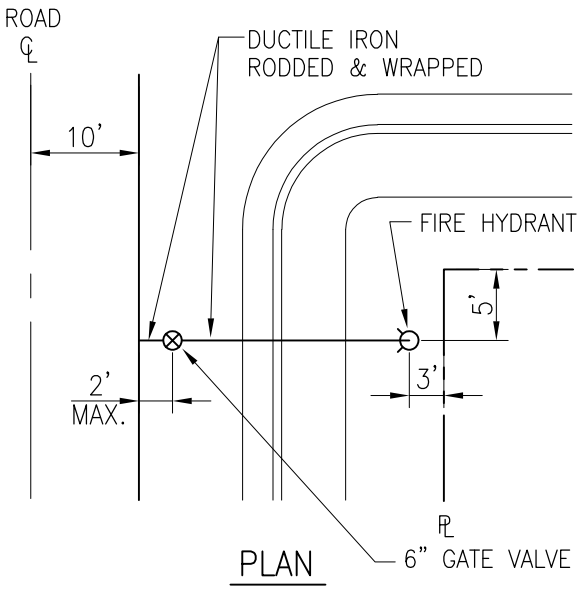
FIRELINE CONNECTION WITH DOMESTIC SERVICE TEE

NOTE: 4" FIRELINE CONNECTION WITH 1–1/2" OR 2" DOMESTIC TEE SHALL BE PLUGGED AND TAPPED WITH AWWA CC THREADS FOR APPLICABLE SIZE.

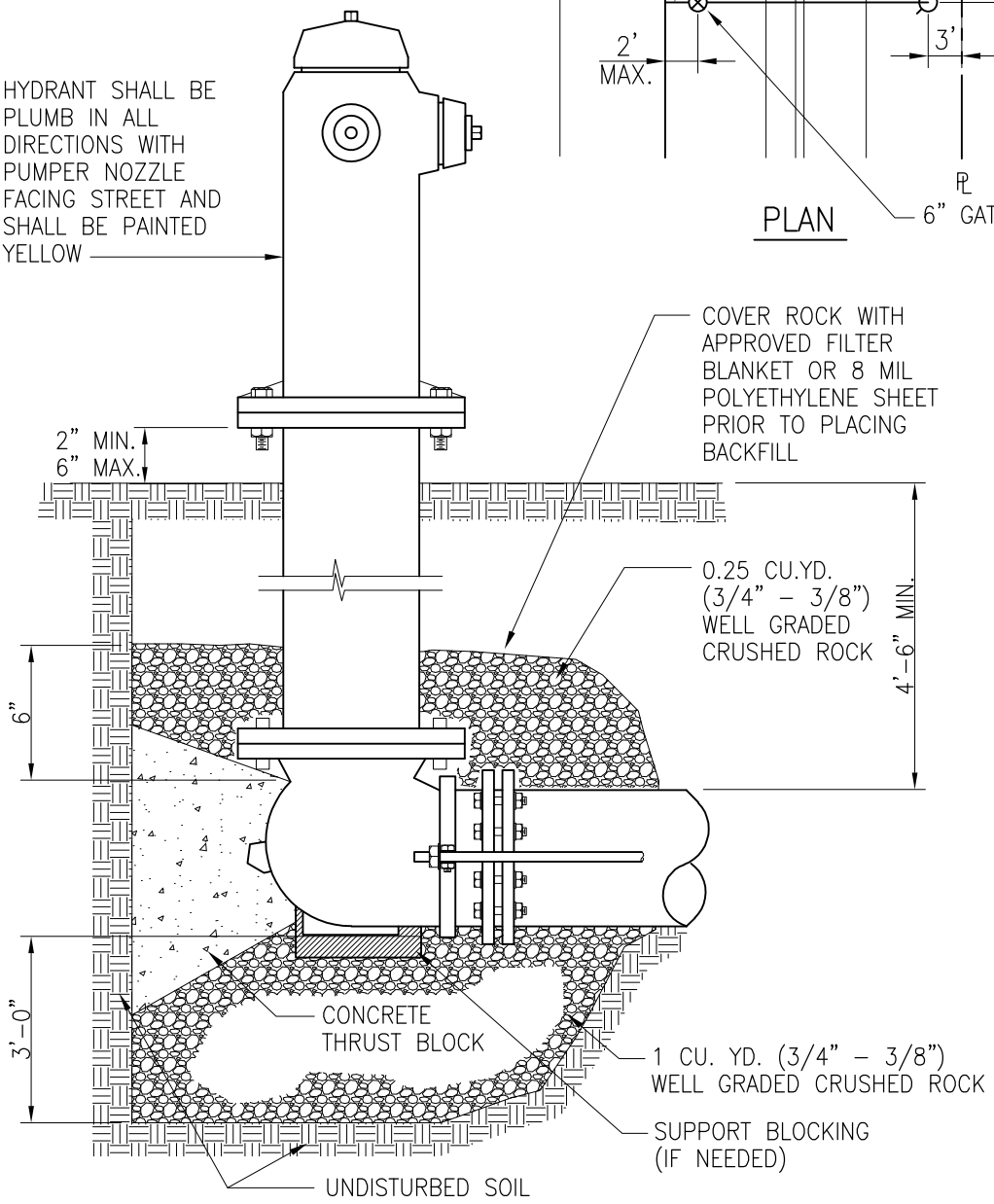
1. EXISTING MAIN
2. TAPPING SLEEVE
3. TAPPING VALVE
4. DOUBLE SPIGOT PIPE
5. PROPERTY LINE VALVE
6. TIE RODS (MEGALUGS ARE NOT ACCEPTABLE)
7. PIPE CLAMP
8. CONCRETE KICKBLOCK
9. M.J. ANCHORING TEE (SWIVEL TEE WHERE APPLICABLE)
10. M.J. VALVE
11. DOMESTIC SERVICE TEE OR SERVICE TAP
12. POLYETHYLENE WRAPPED
13. 90° FITTING (BEND FOR 2" & SMALLER)
14. VALVE OR CURBSTOP AS NOTED ON PLANS & CONTINUE PER APPLICABLE METER DETAIL

	STANDARDS & SPECIFICATIONS	REVISED:	2" AND LARGER FIRELINE CONNECTION
DATE:		DRAWING NO. 200–17	

NOTE:
PIPE MUST BE "FULLY" RESTRAINED WITH EITHER RODDING OR MECHANICAL JOINT RESTRAINT SUCH AS MEGALUGS, OR APPROVED EQUAL.

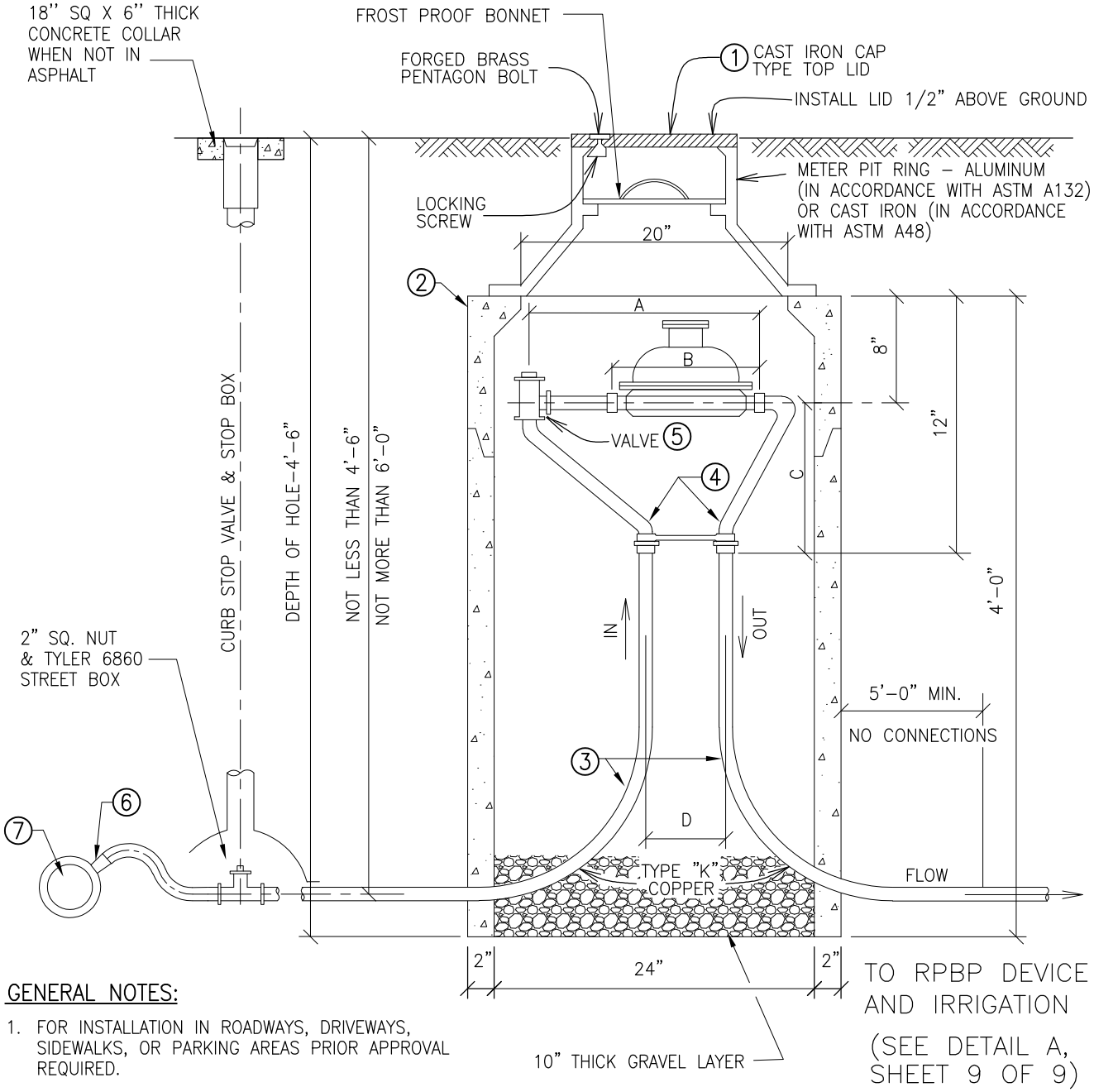


PLAN



MUELLER A-473 OR WATEROUS WB-67 OR M&H HYDRANT

	STANDARDS & SPECIFICATIONS	REVISED:	FIRE HYDRANT DETAIL
DATE:		DRAWING NO. 200-18	



GENERAL NOTES:

1. FOR INSTALLATION IN ROADWAYS, DRIVEWAYS, SIDEWALKS, OR PARKING AREAS PRIOR APPROVAL REQUIRED.
2. NO CONCRETE FLOOR ALLOWED IN METER PIT.
3. METER PIT SHALL BE CONSTRUCTED OF ANY COMBINATION OF CONCRETE RINGS TOTAL – 48" IN LENGTH.
4. ADJUSTMENT RINGS SHALL BE 2", 3", 4" OR 6" IN HEIGHT AND SHALL BE INSERTED BETWEEN THE DOME AND TOP RING.
5. NO CONNECTIONS OR CHANGES IN PIPE DIAMETER SHALL BE MADE FROM THE MAIN TAP TO A DISTANCE OF FIVE FEET BEYOND THE METER PIT WALL ON THE OUTLET SIDE.
6. LID SHALL SAY "WATER METER".

METER SIZE	A	B	C	D
5/8"x 3/4"	12–5/8"	7–13/16"	7–13/16"	4"
3/4"	14–1/4"	9–5/16"	8–15/16"	5"
1"	17–1/4"	11–1/16"	11–1/4"	6"

STANDARDS & SPECIFICATIONS

REVISED:

DATE:

DRAWING NO. 200–19

IRRIGATION 1" METERS AND BELOW

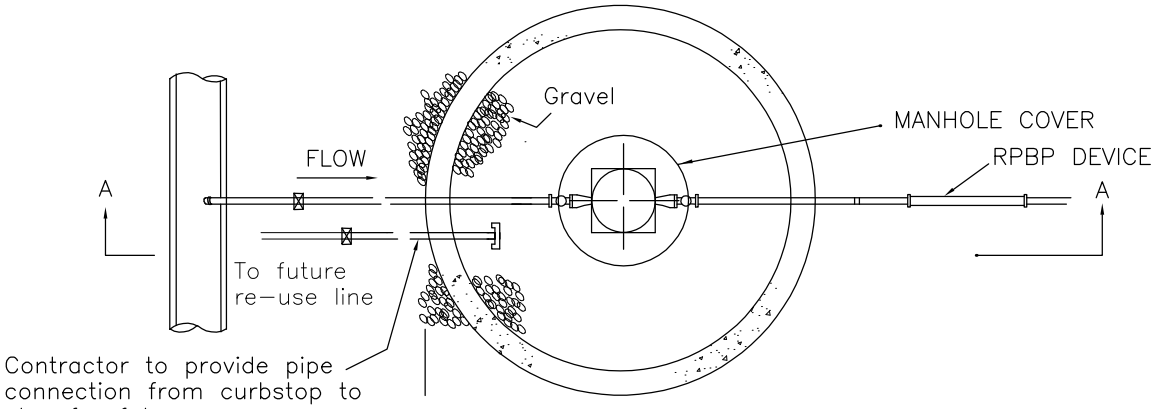
LIST OF MATERIALS

1. RING AND COVER – J'MARK NO. J–2290 (81 LBS.) OR APPROVED EQUAL WITH WITH INTERNAL POST
2. METER PIT – ARCO NO. 24–4 PRECAST MANHOLE (24" DIA.) OR APPROVED EQUAL.
3. SERVICE LINE – COPPER TUBING TYPE K, SAME DIAMETER AS THE METER.
4. METER YOKE ASSEMBLY – FORD 80 SERIES COPPER SETTER OR APPROVED EQUAL.
5. SHUT–OFF VALVE.
6. CORPORATION STOP. A SADDLE MAY BE REQUIRED.
7. RE–USE SOURCE WATERLINE.

NOTES

1. THE AUTHORITY SHALL INSPECT FROM THE MAIN TO THE BUILDING PRIOR TO BACKFILLING.
2. IF THE SURFACE IS NOT TO FINAL GRADE AT TIME OF THE METER INSTALLATION, THE PROPERTY OWNER SHALL RAISE OR LOWER THE METER PIT ACCESS MANHOLE TO MATCH THE FINAL GRADE.
3. THE METER SHALL BE A POSITIVE DISPLACEMENT ROCKWELL OR NEPTUNE TRIDENT 8, READING IN GALLONS.
4. COUPLINGS SHALL BE PROVIDED ON UPSTREAM AND DOWNSTREAM SIDES OF METER TO ALLOW FOR REMOVAL.
5. TRACER WIRE TO BE ATTACHED TO ALL WATER LINES.
6. CAP TYPE TOP LID SHALL BE CAST IRON ONLY. THE INNER LID SHALL BE CAST IRON, ALUMINUM OR RUBBER. THE ALUMINUM SHALL BE COATED WITH A POLYMER SUCH AS EPOXY. CAST IRON SHALL BE COATED WITH AN ASPHALT BASE PAINT.
7. FOR INSTALLATION IN ROADWAYS, DRIVEWAYS, SIDEWALKS, OR PARKING AREAS PRIOR APPROVAL REQUIRED.
8. NO CONCRETE FLOOR ALLOWED IN METER PIT.
9. METER PIT SHALL BE CONSTRUCTED OF ANY COMBINATION OF CONCRETE RINGS TOTAL – 48" IN LENGTH.
10. ADJUSTMENT RINGS SHALL BE 2", 3", 4" OR 6" IN HEIGHT AND SHALL BE INSERTED BETWEEN THE DOME AND THE TOP RING.
11. NO CONNECTIONS OR CHANGES IN PIPE DIAMETER SHALL BE MADE FROM THE MAIN TAP TO A DISTANCE OF FIVE FEET BEYOND THE METER PIT WALL ON THE OUTLET SIDE.

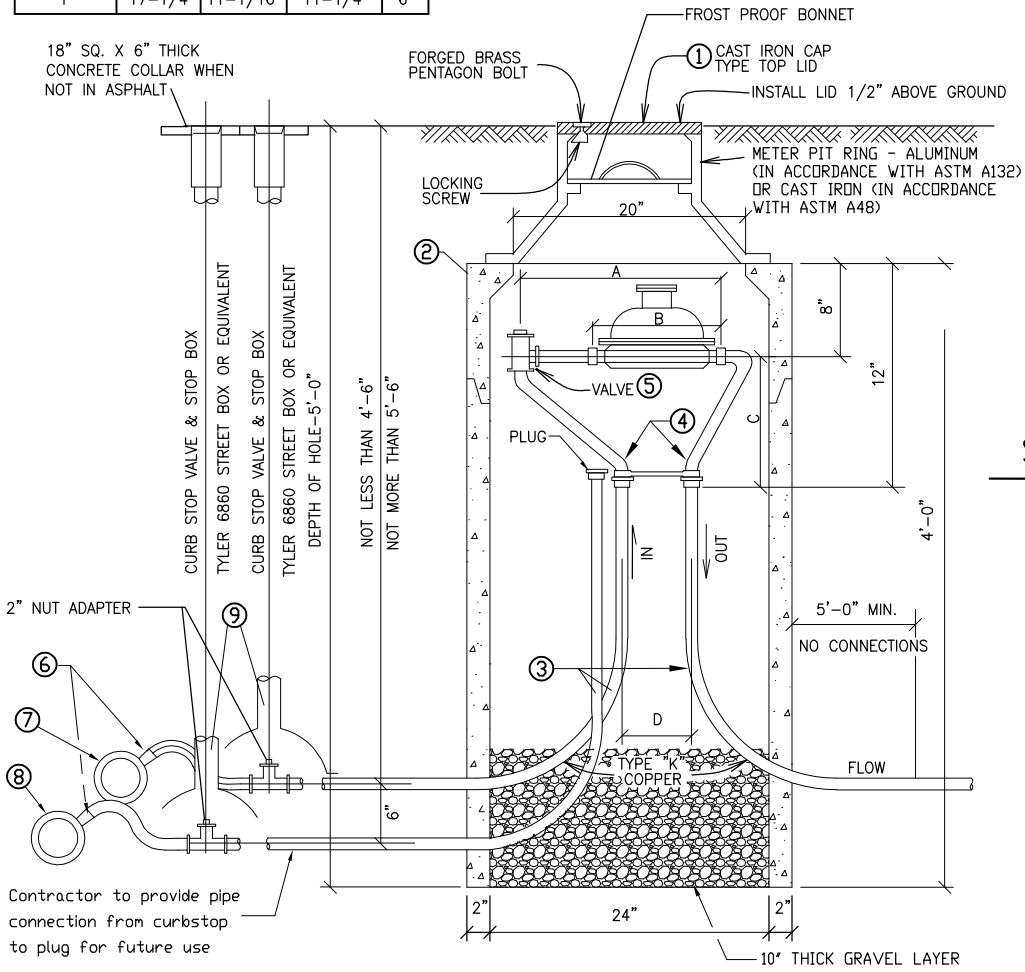
	STANDARDS & SPECIFICATIONS	REVISED:	IRRIGATION 1" METERS AND BELOW
DATE:		DRAWING NO. 200–20	



SECTIONAL PLAN

NO SCALE

METER SIZE	A	B	C	D
5/8"x 3/4"	12-5/8"	7-13/16"	7-13/16"	4"
3/4"	14-1/4"	9-5/16"	8-15/16"	5"
1"	17-1/4"	11-1/16"	11-1/4"	6"



SECTION A

NO SCALE

TO RPBP DEVICE
AND IRRIGATION

(SEE DETAIL A,
SHEET 9 OF 9)

SHEET 3 OF 9

	STANDARDS & SPECIFICATIONS	REVISED:	IRRIGATION METER BACKFLOW PREVENTER 3/4" THRU 1"
DATE:		DRAWING NO. 200-21	

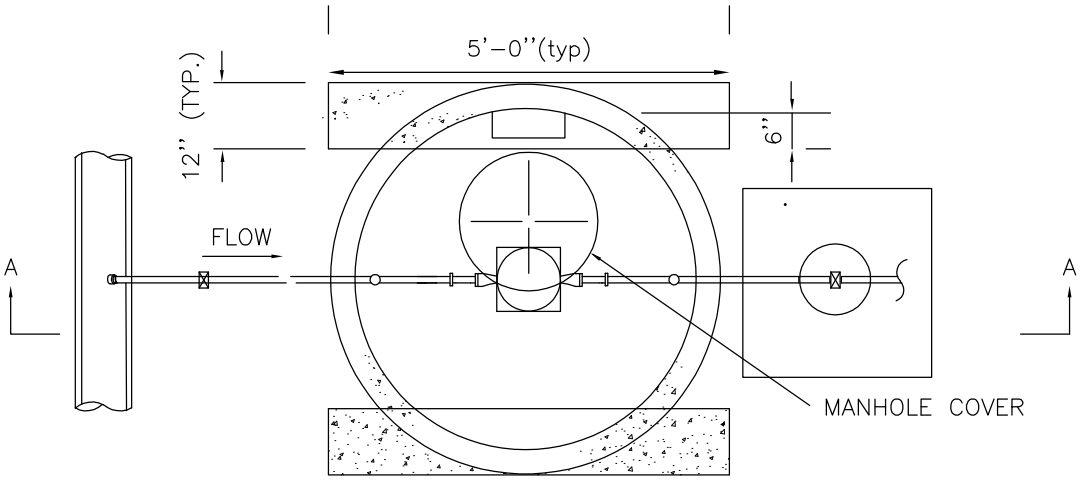
LIST OF MATERIALS

1. RING AND COVER – J'MARK NO. J–2290 (81 LBS.) OR APPROVED EQUAL WITH WITH INTERNAL POST
2. METER PIT – ARCO NO. 24–4 PRECAST MANHOLE (24" DIA.) OR APPROVED EQUAL.
3. SERVICE LINE – COPPER TUBING TYPE K, SAME DIAMETER AS THE METER.
4. METER YOKE ASSEMBLY – FORD 80 SERIES COPPER SETTER OR APPROVED EQUAL.
5. SHUT–OFF VALVE.
6. CORPORATION STOP. A SADDLE MAY BE REQUIRED.
7. EXISTING DOMESTIC SOURCE WATERLINE.
8. FUTURE RE–USE SOURCE WATERLINE.
9. CURB STOP WITH 2" VALVE NUT ADAPTER AND BOX.

NOTES

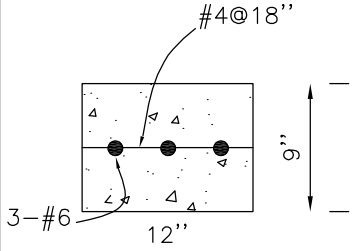
1. THE AUTHORITY SHALL INSPECT FROM THE MAIN TO THE BUILDING PRIOR TO BACKFILLING.
2. IF THE SURFACE IS NOT TO FINAL GRADE AT TIME OF THE METER INSTALLATION, THE PROPERTY OWNER SHALL RAISE OR LOWER THE METER PIT ACCESS MANHOLE TO MATCH THE FINAL GRADE.
3. THE METER SHALL BE A POSITIVE DISPLACEMENT ROCKWELL OR NEPTUNE TRIDENT 8, READING IN GALLONS.
4. COUPLINGS SHALL BE PROVIDED ON UPSTREAM AND DOWNSTREAM SIDES OF METER TO ALLOW FOR REMOVAL.
5. CONTRACTOR TO PROVIDE CONNECTION FROM CURBSTOP TO PLUG AND ALL APPERTENCES FOR RE–USE LINE.
6. TRACER WIRE TO BE ATTACHED TO ALL WATER LINES.
7. CAP TYPE TOP LID SHALL BE CAST IRON ONLY. THE INNER LID SHALL BE CAST IRON, ALUMINUM OR RUBBER. THE ALUMINUM SHALL BE COATED WITH A POLYMER SUCH AS EPOXY. CAST IRON SHALL BE COATED WITH AN ASPHALT BASE PAINT.
8. FOR INSTALLATION IN ROADWAYS, DRIVEWAYS, SIDEWALKS, OR PARKING AREAS PRIOR APPROVAL REQUIRED.
9. NO CONCRETE FLOOR ALLOWED IN METER PIT.
10. METER PIT SHALL BE CONSTRUCTED OF ANY COMBINATION OF CONCRETE RINGS TOTAL – 48" IN LENGTH.
11. ADJUSTMENT RINGS SHALL BE 2", 3", 4" OR 6" IN HEIGHT AND SHALL BE INSERTED BETWEEN THE DOME AND THE TOP RING.
12. NO CONNECTIONS OR CHANGES IN PIPE DIAMETER SHALL BE MADE FROM THE MAIN TAP TO A DISTANCE OF FIVE FEET BEYOND THE METER PIT WALL ON THE OUTLET SIDE.

	STANDARDS & SPECIFICATIONS	REVISED:	IRRIGATION METER BACKFLOW PREVENTER 3/4" THRU 1"
DATE:	DRAWING NO. 200–22		



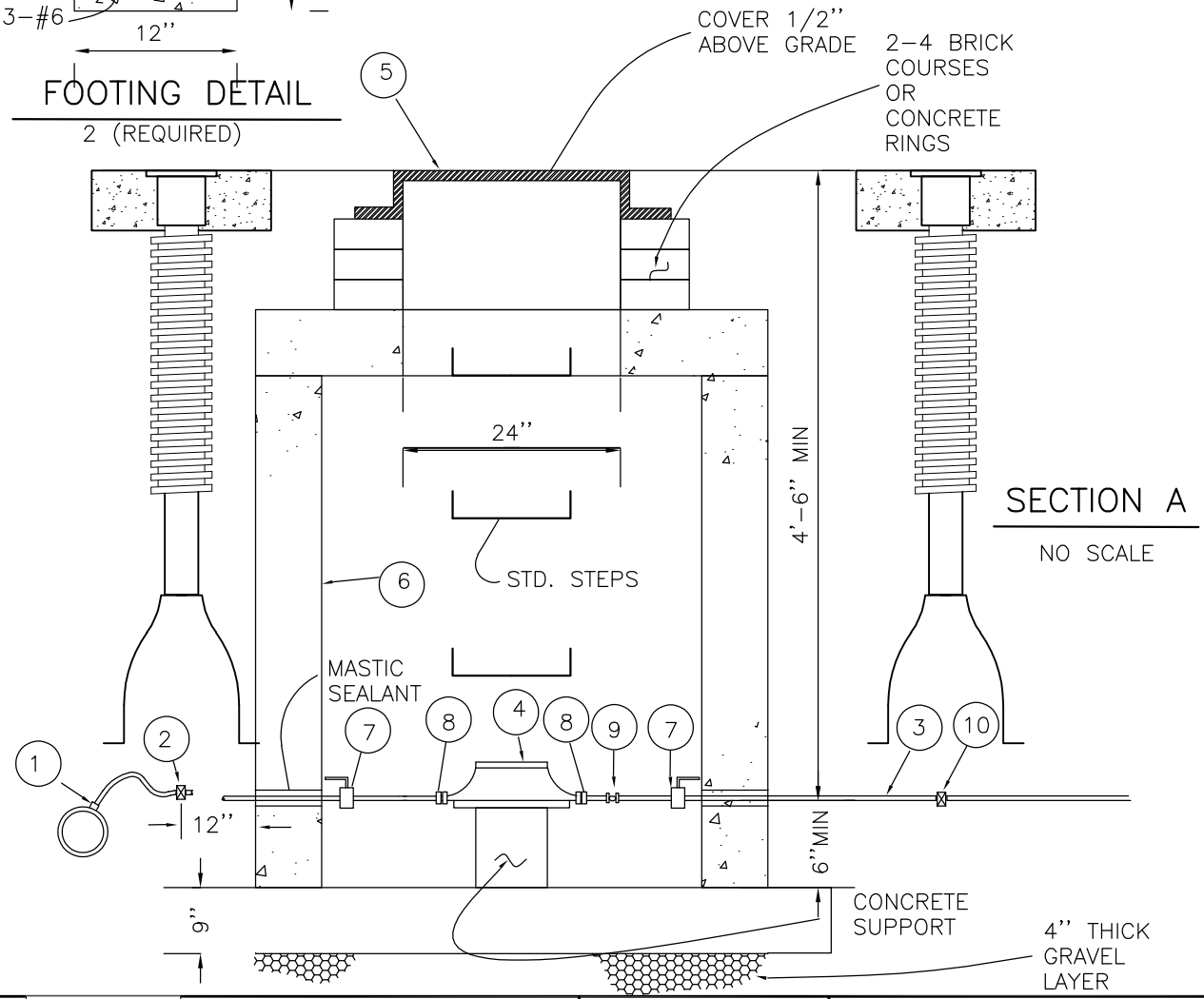
SECTIONAL PLAN

NO SCALE



FOOTING DETAIL

2 (REQUIRED)



SECTION A

NO SCALE

	STANDARDS & SPECIFICATIONS	REVISED:	IRRIGATION METERS 1-1/2" THRU 2" WITHOUT PRV
DATE:		DRAWING NO. 200-23	

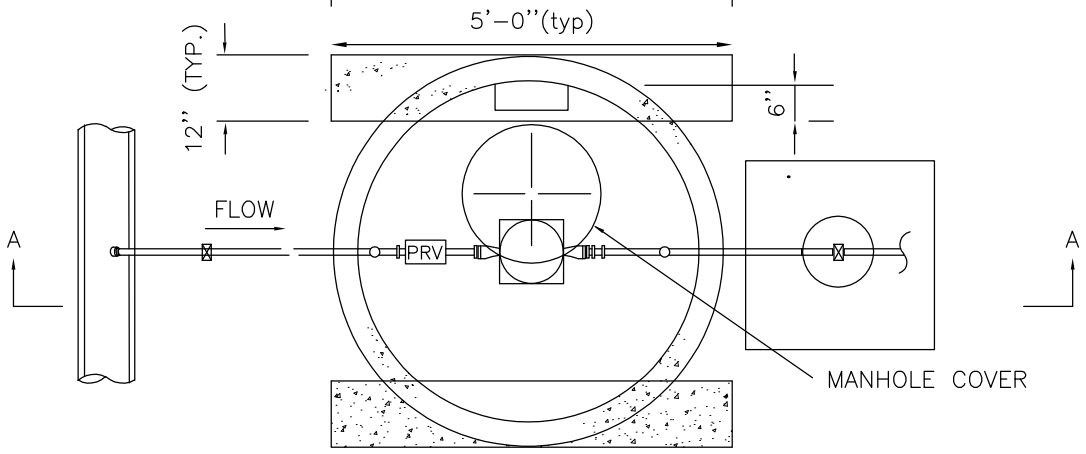
LIST OF MATERIALS

1. CORPORATION STOP VALVE.
2. CURB STOP VALVE AND BOX W/ 2" OPERATOR NUT AND FLARED COPPER ENDS. CURB STOP VALVE BOX MUST BE A 3–PIECE BOX WITH 5–1/4" BARREL AND WIDE OVAL BASE (TYLER 6860 SERIES, OR APPROVED EQUAL).
3. SERVICE LINE – COPPER TUBING TYPE K, SAME DIAMETER AS THE METER.
4. METER – POSITIVE DISPLACEMENT ROCKWELL OR NEPTUNE TRIDENT 8, READING IN GALLONS
5. RING AND COVER – J'MARK NO. J1163 (125 LBS. COVER) OR APPROVED WITH WATER CAST INTO COVER.
6. METER PIT – 48'' DIA. PRECAST MANHOLE ASTM C478, FLAT TOP.
7. BALL VALVE– FORD BALL VALVE CURB STOP W/ FEMALE THREAD IRON PIPE & FLARED COPPER ENDS OR EQUAL. (2 REQ.)
8. BRASS FLANGE COUPLING
9. FORD LOK–PAK ADJUSTMENT COUPLING W/2 STAINLESS STEEL SET SCREWS.
10. STOP & WASTE VALVE W/FLARED COPPER ENDS.

NOTES

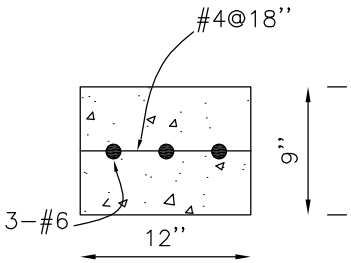
1. THE DISTRICT SHALL INSPECT FROM THE MAIN TO THE BUILDING PRIOR TO BACKFILLING.
2. IF THE SURFACE IS NOT TO FINAL GRADE AT TIME OF THE METER INSTALLATION, THE PROPERTY OWNER SHALL RAISE OR LOWER THE METER PIT ACCESS MANHOLE TO MATCH THE FINAL GRADE.
3. COUPLINGS SHALL BE PROVIDED ON UPSTREAM AND DOWNSTREAM SIDES OF METER TO ALLOW FOR REMOVAL.
4. TOP STEP 18" – 24" BELOW THE SURFACE, REMAINDER SPACED AT 12" INTERVALS.
5. REFER TO IRRIGATION SYSTEM RP–TYPE BACKFLOW PREVENTER SCHEMATIC DETAIL IF METER TO BE USED FOR RE–USE, IRRIGATION OR EFFLUENT WATER PURPOSES.

	STANDARDS & SPECIFICATIONS	REVISED:	IRRIGATION METERS 1-1/2" THRU 2" WITHOUT PRV
DATE:	DRAWING NO. 200–24		



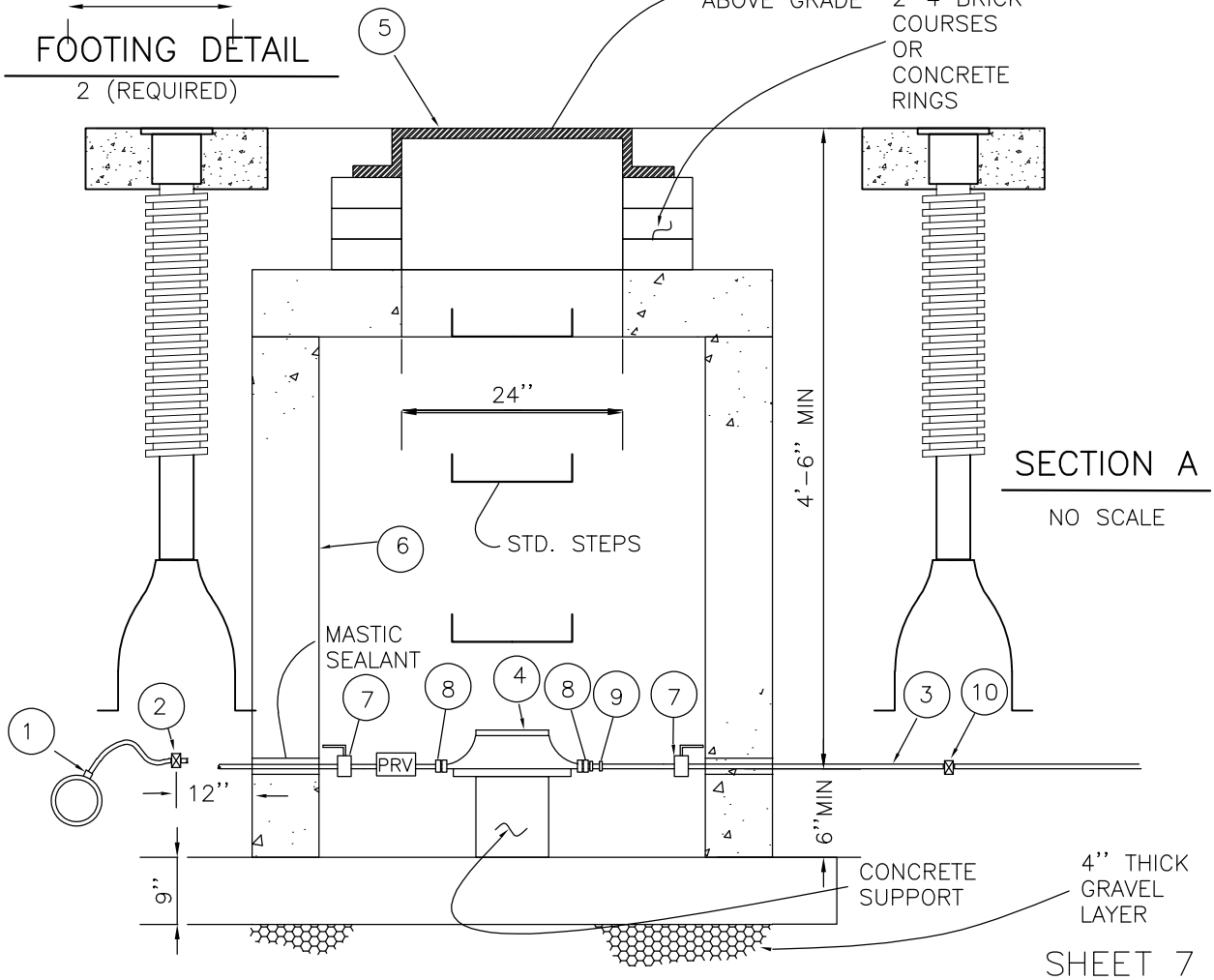
SECTIONAL PLAN

NO SCALE



FOOTING DETAIL

2 (REQUIRED)



SECTION A

NO SCALE

STANDARDS & SPECIFICATIONS	REVISED:	IRRIGATION METERS 1-1/2" THRU 2" WITH PRV
DATE:	DRAWING NO. 200–25	

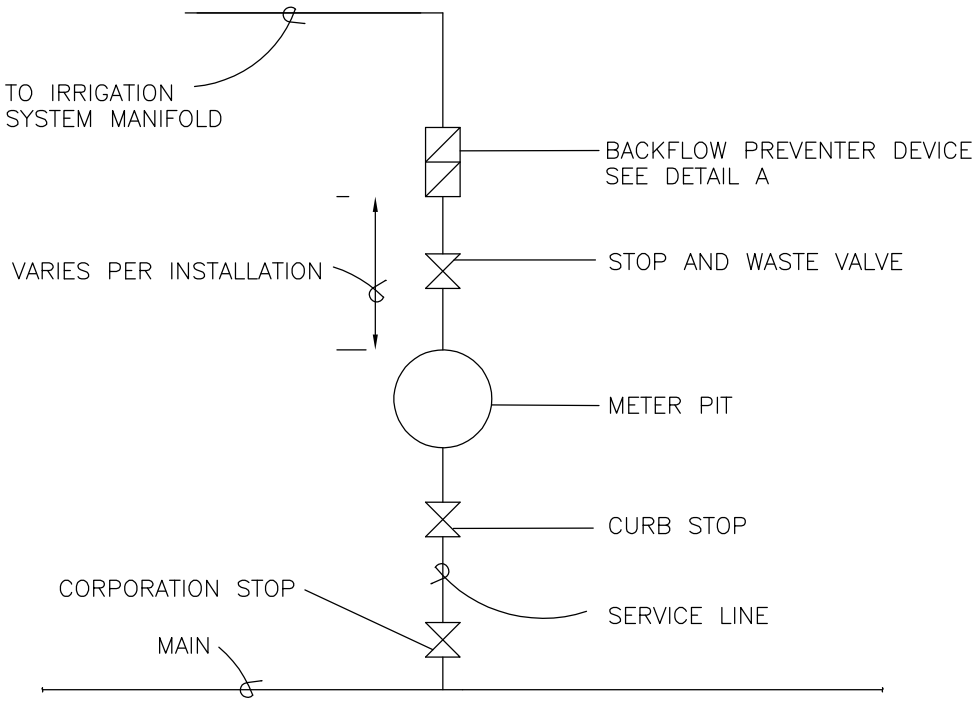
LIST OF MATERIALS

1. CORPORATION STOP VALVE.
2. CURB STOP VALVE AND BOX W/ 2" OPERATOR NUT AND FLARED COPPER ENDS. CURB STOP VALVE BOX MUST BE A 3–PIECE BOX WITH 5–1/4" BARREL AND WIDE OVAL BASE (TYLER 6860 SERIES, OR APPROVED EQUAL)
3. SERVICE LINE – COPPER TUBING TYPE K, SAME DIAMETER AS THE METER.
4. METER – POSITIVE DISPLACEMENT ROCKWELL OR NEPTUNE TRIDENT 8, READING IN GALLONS
5. RING AND COVER – J'MARK NO. J1163 (125 LBS. COVER) OR APPROVED WITH WATER CAST INTO COVER.
6. METER PIT – 48'' DIA. PRECAST MANHOLE ASTM C478, FLAT TOP.
7. BALL VALVE– FORD BALL VALVE CURB STOP W/ FEMALE THREAD IRON PIPE & FLARED COPPER ENDS OR EQUAL. (2 REQ.)
8. BRASS FLANGE COUPLING.
9. FORD LOK–PAK ADJUSTMENT COUPLING W/2 STAINLESS STEEL SET SCREWS.
10. STOP & WASTE VALVE W/FLARED COPPER ENDS.

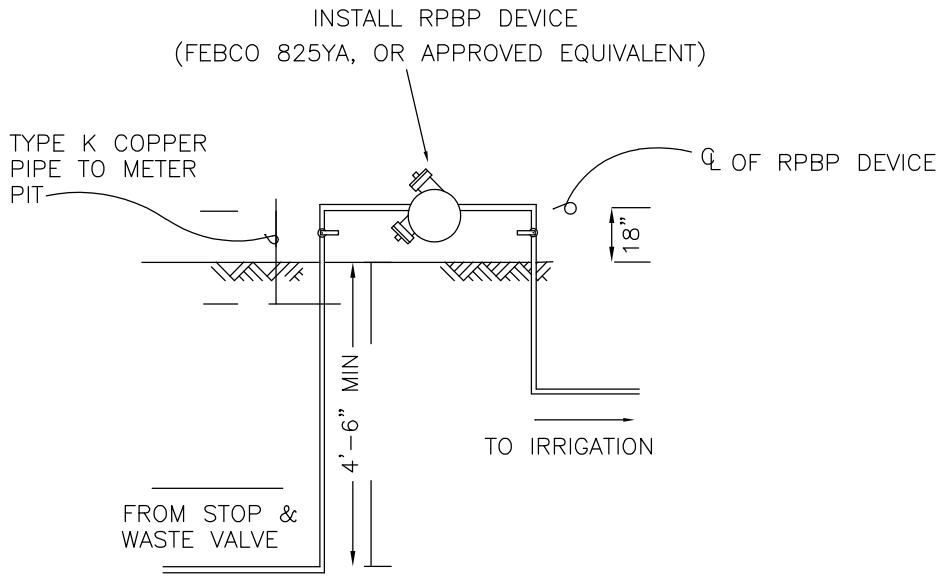
NOTES

1. THE DISTRICT SHALL INSPECT FROM THE MAIN TO THE BUILDING PRIOR TO BACKFILLING.
2. IF THE SURFACE IS NOT TO FINAL GRADE AT TIME OF THE METER INSTALLATION, THE PROPERTY OWNER SHALL RAISE OR LOWER THE METER PIT ACCESS MANHOLE TO MATCH THE FINAL GRADE.
3. BRASS FLANGE COUPLINGS SHALL BE PROVIDED ON UPSTREAM AND DOWNSTREAM SIDES OF METER TO ALLOW FOR REMOVAL.
4. TOP STEP TO BE 18" TO 24" BELOW THE SURFACE, AT 12" VERTICAL INTERVALS.
5. REFER TO IRRIGATION SYSTEM RP–TYPE BACKFLOW PREVENTER SCHEMATIC DETAIL IF APPLICABLE.

	STANDARDS & SPECIFICATIONS	REVISED:	IRRIGATION METERS 1-1/2" THRU 2" WITH PRV
DATE:		DRAWING NO. 200–26	



PLAN



DETAIL A

NO SCALE

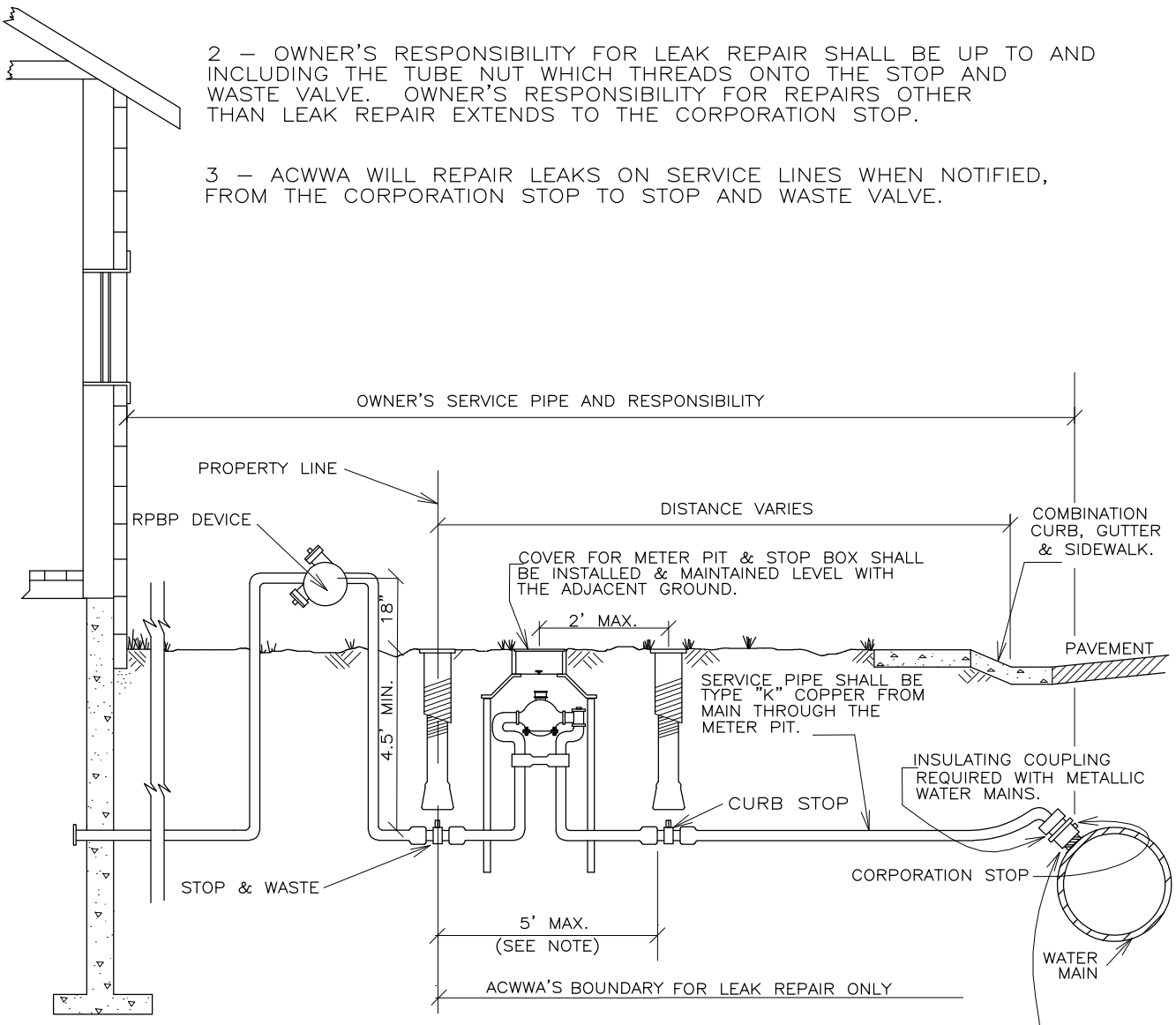
	STANDARDS & SPECIFICATIONS	REVISED:	IRRIGATION SYSTEM WITH RPBP
DATE:		DRAWING NO. 200-27	

NOTE:

1 – PLACEMENT OF STOP BOX CAN VARY FROM A MAXIMUM OF 5 FEET OUTSIDE THE PROPERTY LINE TO THE PROPERTY LINE. PLACEMENT OF THE STOP BOX OUTSIDE THE PROPERTY LINE IS PREFERRED.

2 – OWNER'S RESPONSIBILITY FOR LEAK REPAIR SHALL BE UP TO AND INCLUDING THE TUBE NUT WHICH THREADS ONTO THE STOP AND WASTE VALVE. OWNER'S RESPONSIBILITY FOR REPAIRS OTHER THAN LEAK REPAIR EXTENDS TO THE CORPORATION STOP.

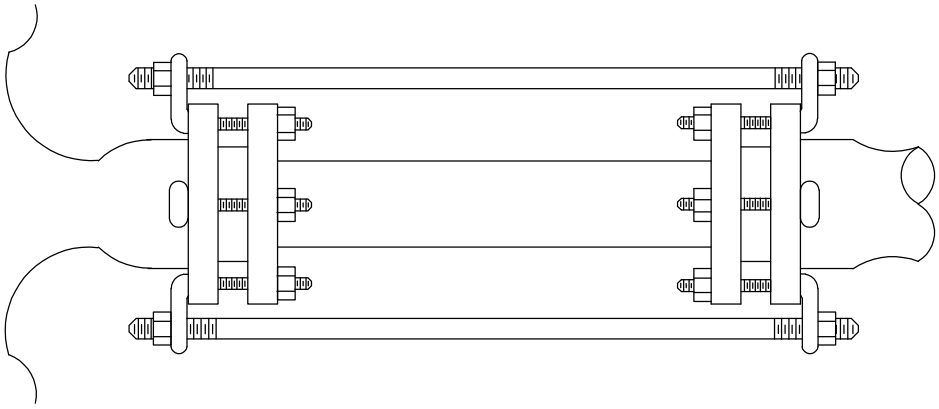
3 – ACWWA WILL REPAIR LEAKS ON SERVICE LINES WHEN NOTIFIED, FROM THE CORPORATION STOP TO STOP AND WASTE VALVE.



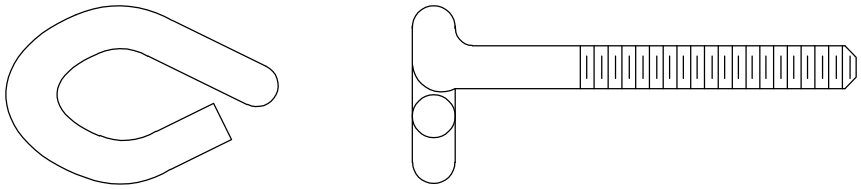
SHOULD ANY SITUATION ARISE OTHER THAN SHOWN CONCERNING THE DEPTH OR OBSTRUCTION OF SERVICE LINE OR THE PLACEMENT OF METER PIT OR STOP BOX CALL 303-790-4830 AND ASK FOR CUSTOMER SERVICES FIELD SECTION.

DIRECT TAPS ARE NOT ALLOWED. SADDLE TAPS ARE REQUIRED FOR ALL PIPE.

	STANDARDS & SPECIFICATIONS	REVISED:	DOMESTIC METER AND IRRIGATION WITH RPBP
DATE:		DRAWING NO. 200-28	



PLAN



DETAIL

DIMENSIONS

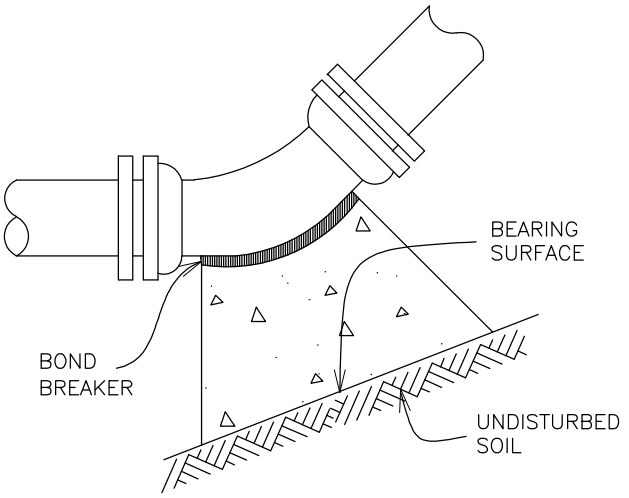
ALLOWABLE PIPE DIAMETER INCHES	BOLT SIZE	NO . OF BOLTS REQUIRED
4	3/4"	2
6	3/4"	2
8	3/4"	2
10	3/4"	4
12	3/4"	6

NOTES:

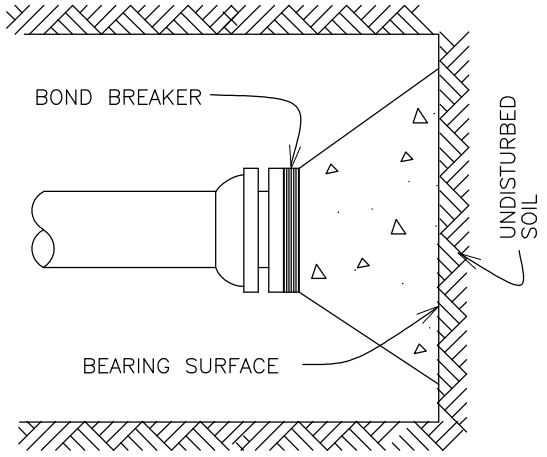
1 – THE BOLT SHALL BE MANUFACTURED OF "COR–TEN" OR APPROVED EQUAL.

2 – THE BOLT MAY BE HEAT TREATED.

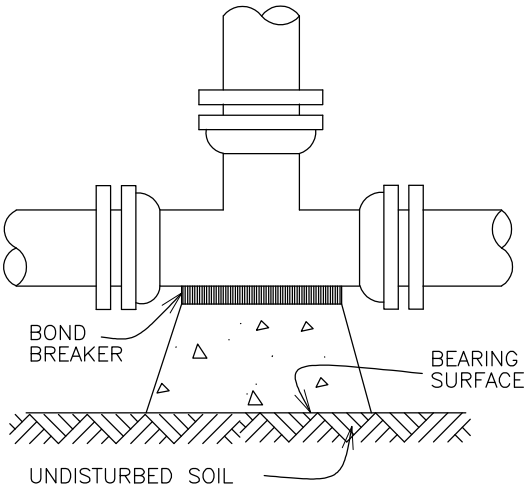
	STANDARDS & SPECIFICATIONS	REVISED:	JOINT RESTRAINT DETAIL
DATE:		DRAWING NO. 200–29	



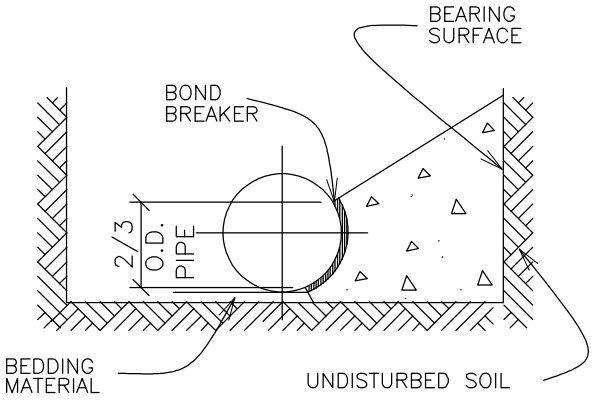
$11\frac{1}{4}°$, $22\frac{1}{2}°$, 45° AND 90° BENDS



DEAD END



TEE



TYPICAL CROSS SECTION

MINIMUM BEARING SURFACE AREA

(IN SQUARE FEET)

SIZE OF PIPE	BENDS				TEE OR DEAD END
	$11\frac{1}{4}°$	$22\frac{1}{2}°$	45°	90°	
4"	1.00	1.00	1.00	N.A.	1.50
6"	1.00	1.25	2.25	4.25	3.00
8"	1.00	2.00	4.00	8.00	5.25
12"	2.25	4.50	8.75	12.00	11.25
16"	3.75	7.50	14.50	27.00	19.00
20"	5.00	10.00	19.50	35.50	25.00
24"	7.00	14.00	27.75	51.00	36.00

NOTES:

1.) BEARING SURFACES SHOWN IN CHART ARE MINIMUM.

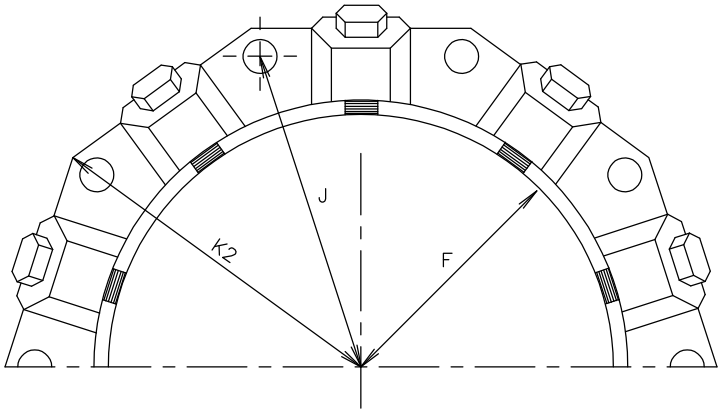
2.) BASED ON 150 PSI INTERNAL PIPE PRESSURE PLUS WATER HAMMER.
4",6",8" AND 12" WATER HAMMER = 110 P.S.I.
16",20' AND 24" WATER HAMMER = 70 P.S.I.

3.) CONCRETE MUST BE MINIMUM OF 3000 PSI, AND CURE FOR 24 HOURS BEFORE TAMPING OR COMPACTING.

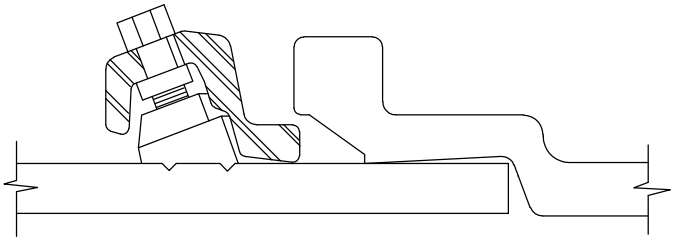
4.) BASED ON 3,000 psf SOIL BEARING CAPACITY.

5.) NA = NOT APPLICABLE.

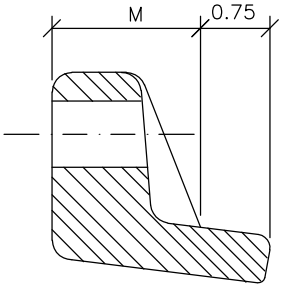
	STANDARDS & SPECIFICATIONS	REVISED:	CONCRETE KICKBLOCKS
DATE:		DRAWING NO. 200-30	



MECHANICAL JOINT RESTRAINT



WEDGE DETAIL



BOLT HOLE DETAIL

DIMENSIONS

	NOMINAL PIPE SIZE	NO. OF BOLTS	NO. OF WEDGES	K2 INCHES	J INCHES	F INCHES	M INCHES	
PVC	4"	2	2					
	6"	6	3	11.12	9.50	7.00	0.88	PVC
	8"	6	4	13.37	11.75	9.15	1.00	
	10"	8	6	15.62	14.00	11.20	1.00	
	12"	8	8	17.88	16.25	13.30	1.25	
DI	4"	4	2					
	6"	6	3	11.12	9.50	7.00	0.88	DI
	8"	6	4	13.37	11.75	9.15	1.00	
	10"	8	6	15.62	14.00	11.20	1.00	
	12"	8	8	17.88	16.25	13.30	1.25	

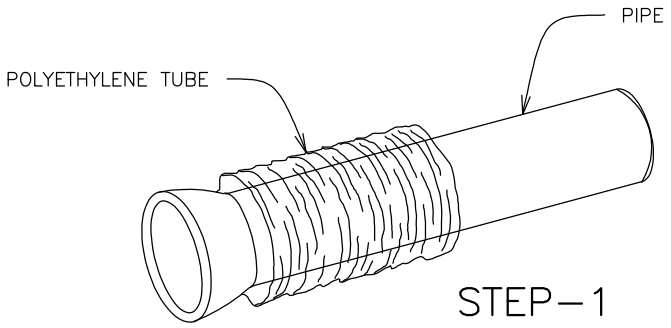
STANDARDS & SPECIFICATIONS

REVISED:

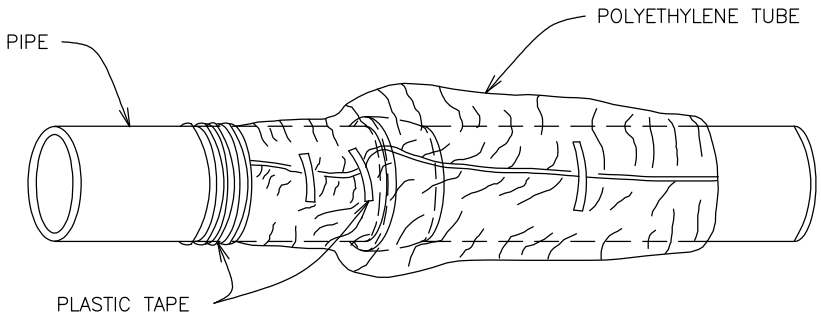
DATE:

DRAWING NO. 200-31

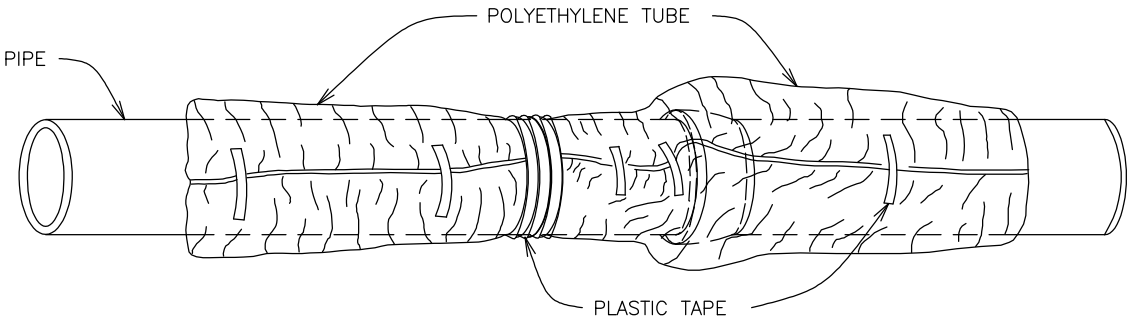
MECHANICAL JOINT RESTRAINT



STEP–1



STEP–2



STEP–3

FIELD INSTALLATION–POLYETHYLENE WRAP

STEP–1 PLACE TUBE OF POLYETHYLENE MATERIAL AROUND PIPE PRIOR TO LOWERING PIPE INTO TRENCH.

STEP–2 PULL THE TUBE OVER THE LENGTH OF THE PIPE. TAPE TUBE TO PIPE AT JOINT. FOLD MATERIAL AROUND THE ADJACENT SPIGOT END AND WRAP WITH THREE CIRCUMFERENTIAL TURNS OF TWO–INCH WIDE PLASTIC TAPE TO HOLD PLASTIC TUBE AROUND SPIGOT END.

STEP–3 ADJACENT TUBE OVERLAPS FIRST TUBE AND IS SECURED WITH PLASTIC ADHESIVE TAPE. THE POLYETHYLENE TUBE MATERIAL COVERING THE PIPE WILL BE LOOSE. EXCESS MATERIAL SHALL BE NEATLY DRAWN UP AROUND THE PIPE BARREL, FOLDED INTO AN OVERLAP ON TOP OF THE PIPE AND HELD IN PLACE BY MEANS OF PIECES OF THE PLASTIC TAPE AT APPROXIMATELY THREE TO FIVE FOOT INTERVALS.

	STANDARDS & SPECIFICATIONS	REVISED:	POLYETHYLENE WRAP
DATE:		DRAWING NO. 200–32	

DATE:

STANDARDS & SPECIFICATIONS

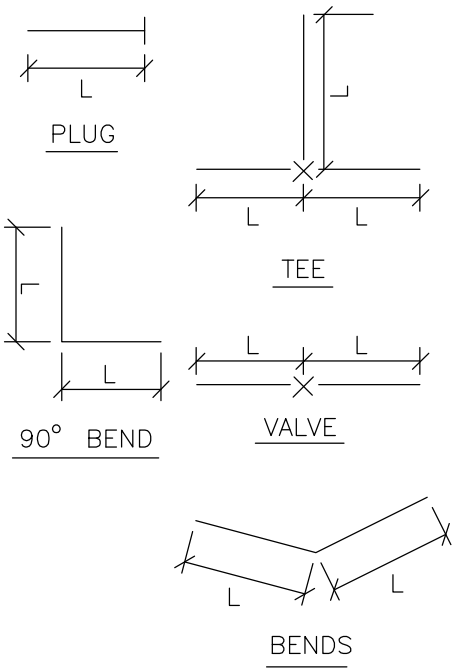
DRAWING NO. 200-33

REVISED:

RESTRAINED PIPE

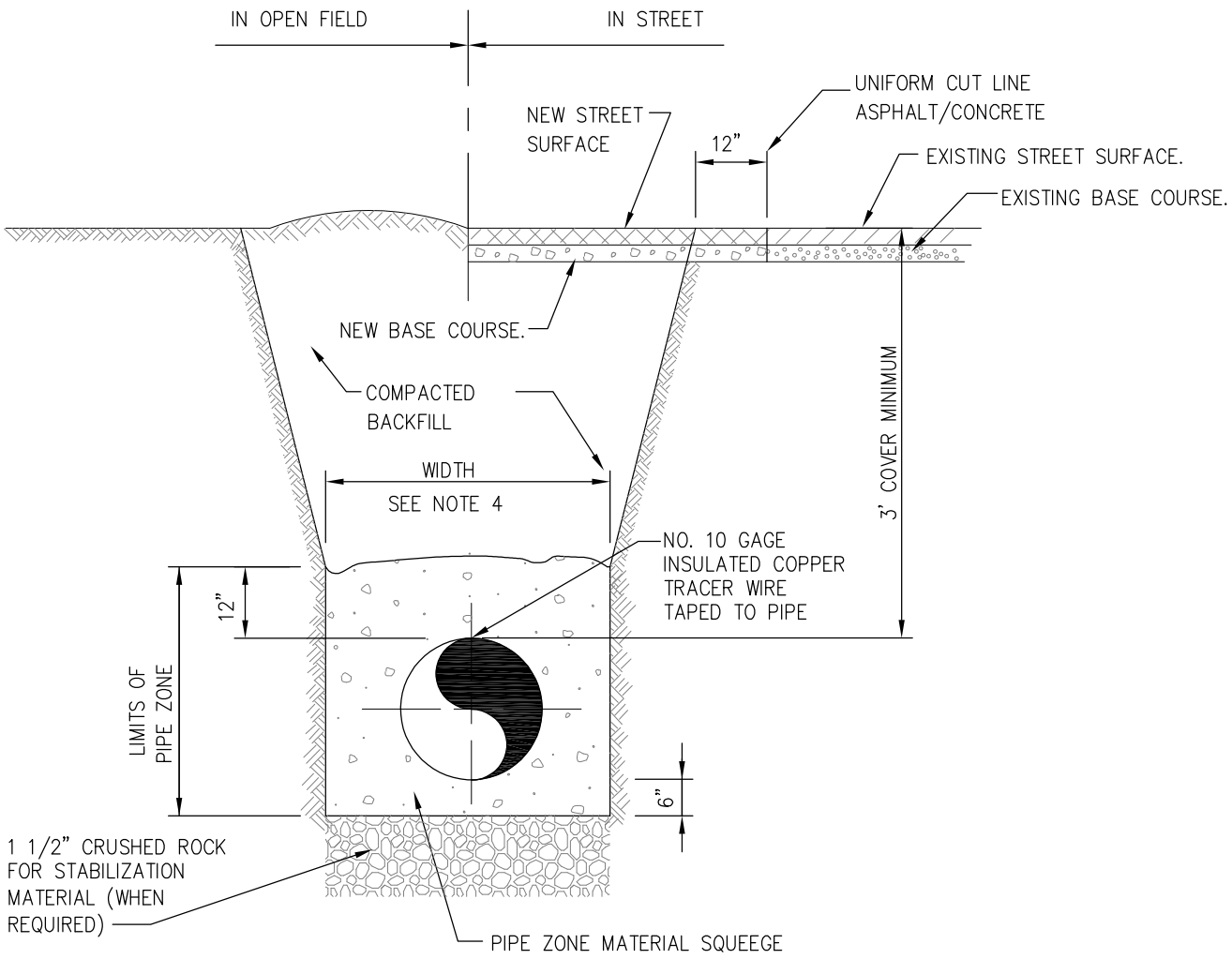
ROD DIAMETER, GRADE & LENGTH OF RESTRAINED PIPE

PIPE SIZE	4"			6"			8"			12"			16"			20"			24"		
FITTING	D	L	G	D	L	G	D	L	G	D	L	G	D	L	G	D	L	G	D	L	G
90° BEND TEE, PLUG	3/4"	30'	M.S.	3/4"	45'	M.S.	3/4"	60'	M.S.	3/4"	86'	H.S.	1"	108'	H.S.	1 1/4"	132'	H.S.	—	155'	—
VALVE	3/4"	30'	M.S.	3/4"	45'	M.S.	3/4"	60'	M.S.	3/4"	86'	H.S.	1"	108'	H.S.	1 1/4"	132'	H.S.	—	155'	—
45° BEND	3/4"	9'	M.S.	3/4"	13'	M.S.	3/4"	18'	M.S.	3/4"	25'	M.S.	1"	32'	M.S.	3/4"	39'	H.S.	—	45'	—
22 1/2° BEND	3/4"	1'	M.S.	3/4"	4'	M.S.	3/4"	5'	M.S.	3/4"	7'	M.S.	3/4"	8'	M.S.	3/4"	10'	M.S.	—	12'	—
11 1/4° BEND	3/4"	1'	M.S.	3/4"	1'	M.S.	3/4"	1'	M.S.	3/4"	2'	M.S.	3/4"	2'	M.S.	3/4"	3'	M.S.	—	3'	—



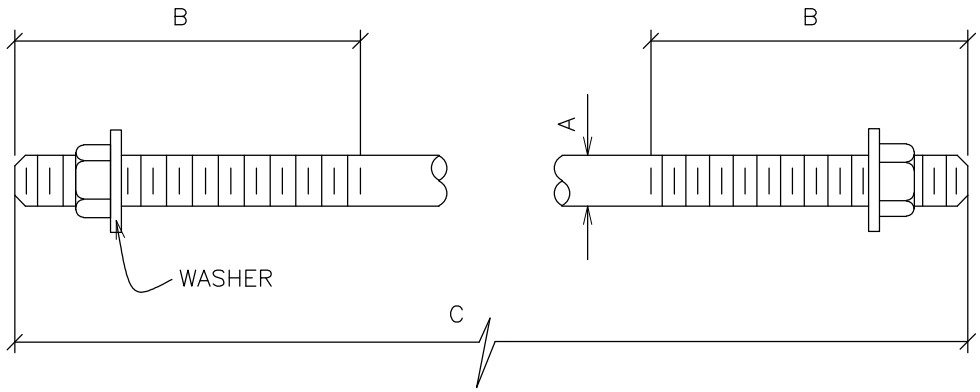
NOTES:

1.) LENGTH OF RESTRAINED PIPE MEASURED EACH WAY FROM VALVES AND BENDS.
2.) CLAMPS, RODS & MEGALUGS NOT ALLOWED FOR 24" & LARGER PIPES.
3.) D=DIAMETER, L=LENGTH, G=GRADE
M.S.=MILD STEEL, H.S.=HIGH STRENGTH.
4.) MINIMUM 4.5' GROUND COVER REQUIRED.
5.) BASED ON 150 PSI INTERNAL PRESSURE
6.) M.S. = MILD STEEL ROD ASTM A36.
7.) H.S. = HIGH STRENGTH ROD ASTM A193 GRADE B7.
8.) NUTS SHALL BE ASTM A307 GRADE A OR B HEXAGON HEAVY SERIES.
HIGH STRENGTH NUTS SHALL BE ASTM A 194, GRADE 2H.
9.) SEE TIE ROD DETAIL DRAWING. ALSO, TIE ROD COUPLING DETAILS,
CLAMP DETAILS AND SET CLAMP DETAILS.
10.) LENGTH REFERS TO THE AMOUNT OF PIPE WHICH MUST BE RESTRAINED
TOGETHER AND IS NOT NECESSARILY THE LENGTH OF THE RODS.
11.) LENGTH OF RESTRAINED PIPE CHART IS ALSO FOR THE LENGTH OF JOINT
RESTRAINT FOR EBBA IRON MEGALUGS OR UNIFLANGE PIPE RESTRAINT DEVICES.
12.) CROSSES MUST BE RESTRAINED IN ALL APPLICABLE DIRECTIONS.
13.) 12" AND SMALLER IN LINE VALVES AND TEES SHALL HAVE A MECHANICAL JOINT RESTRAINT DEVICE
ON EACH SIDE OF THE FITTING OR VALVE. MECHANICAL JOINT RESTRAINT DEVICE SHALL BE: DIP –
EBAA 1100 SERIES, UNI-FLANGE SERIES 1400, OR EQUIVALENT; PVC – EBAA MEGALUG 2000 PV SERIES,
UNI-FLANGE SERIES 1500, OR EQUIVALENT.
14.) A SECOND VALVE WILL BE REQUIRED TO BE CLOSED WHEN EXCAVATING NEXT TO AN EXISTING VALVE.

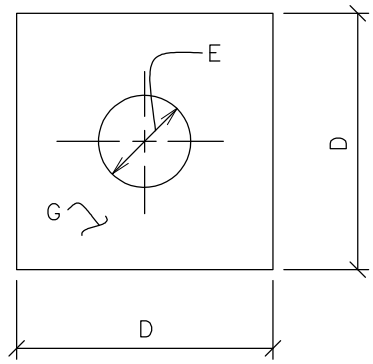


NOTES:
1. PAVING SHALL COMPLY WITH LOCAL AUTHORITY JURISDICTION.
2. TRENCH WALLS TO BE SUPPORTED AS REQUIRED BY O.S.H.A.
3. MINIMUM COVER TO BE BELOW OFFICIAL STREET GRADE.
4. MINIMUM TRENCH WIDTH = PIPE O.D. + 12"
   MAXIMUM TRENCH WIDTH = PIPE O.D. +24"

	STANDARDS & SPECIFICATIONS	REVISED:	TYPICAL TRENCH SECTION
DATE:	DRAWING NO. 200-34		



TIE ROD DETAILS



WASHER DETAIL

TIE RODS			
A	B	C	
ROD DIAMETER	THREAD LENGTH	ROD LENGTH	GRADE
3/4",1"	6"	1' TO 11' & 20'	MS
3/4",1-1/2"	ALL THREAD	1' TO 11' & 20'	HS

WASHERS		
D	E	G
WIDTH	HOLE DIAMETER	THICKNESS
5"	1/8" Larger than Rod Ø	1/2"
6"	1/8" Larger than Rod Ø	5/8"

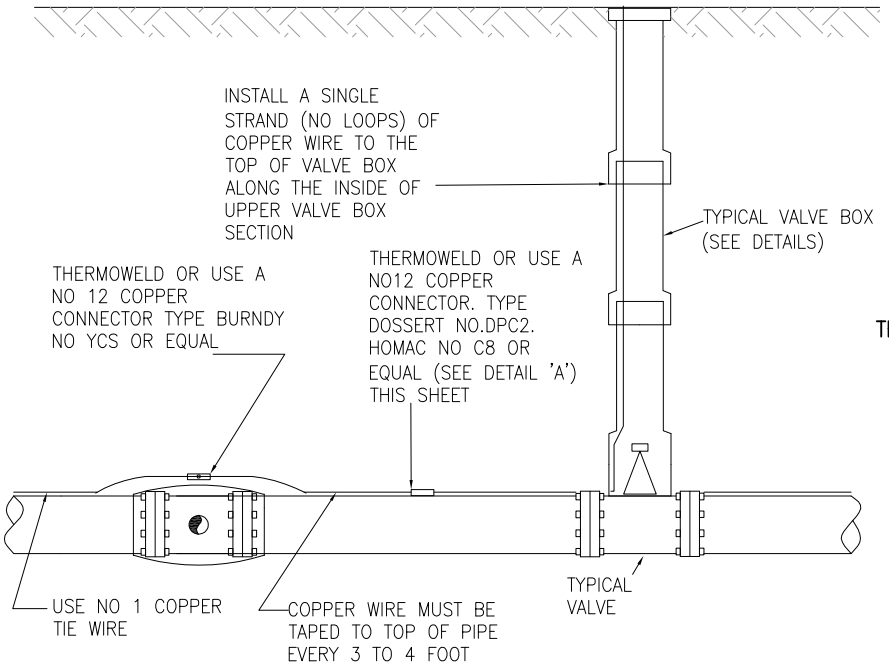
NOTE:

1.) SEE TIED JOINTS, ROD DIMENSIONS SHEET.

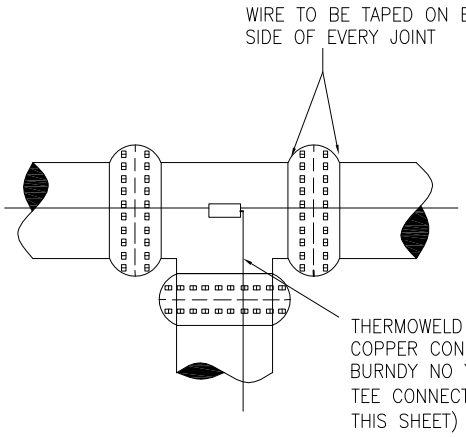
2.) SEE CLAMP DETAILS AND DIMENSIONS FOR PROPER PLACEMENT OF WASHERS.

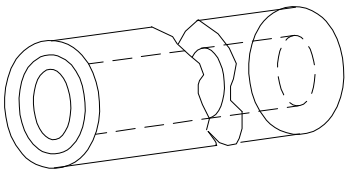
3.) MS=MILD STEEL
HS=HIGH STRENGTH

	STANDARDS & SPECIFICATIONS	REVISED:	TIE ROD AND WASHER DETAIL
DATE:		DRAWING NO. 200-35	

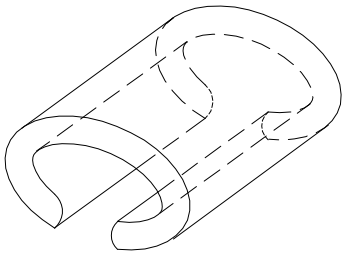


TRACER WIRE



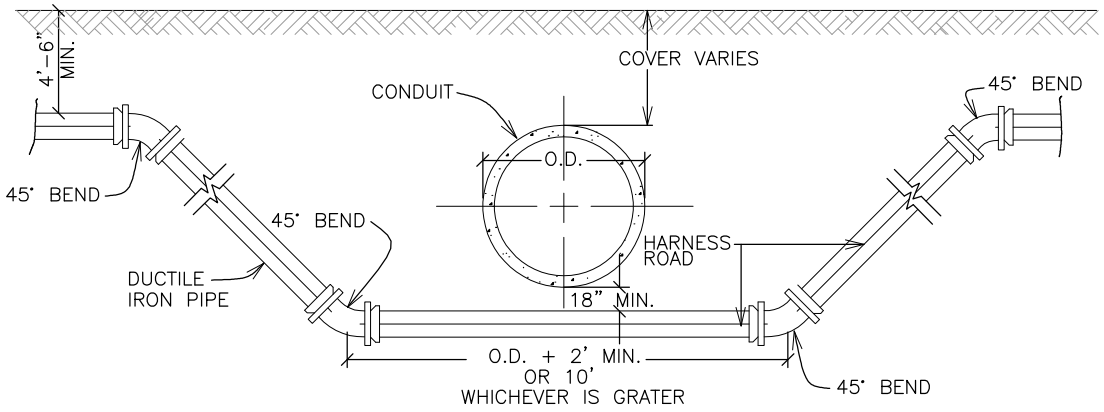


DETAIL 'A'



DETAIL 'B'

	STANDARDS & SPECIFICATIONS	REVISED:	TRACE WIRE DETAILS
DATE:		DRAWING NO. 200–36	



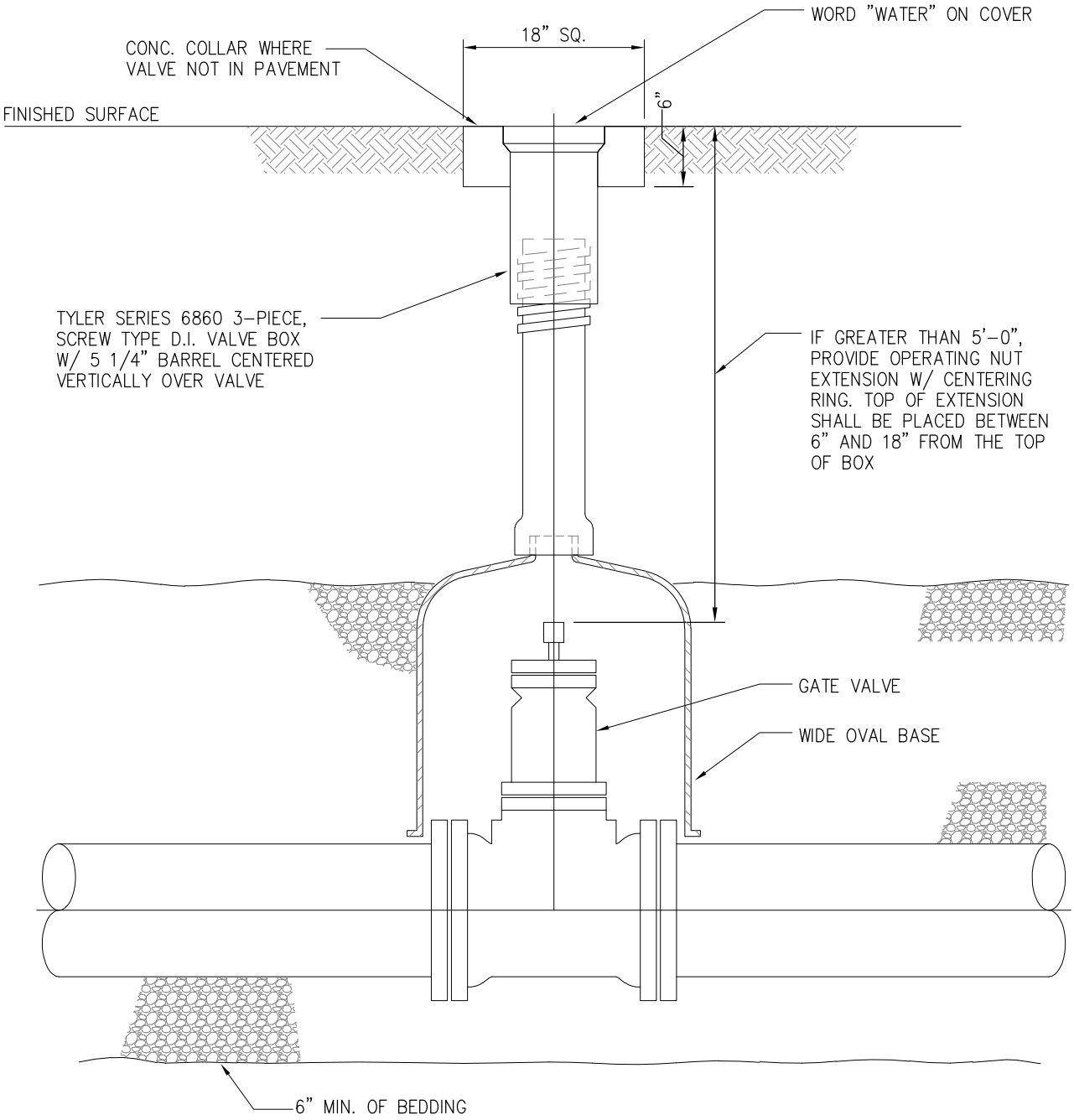
UTILITY CROSSING
N.T.S.

1.) LENGTH OF EXTENSION OF PIPE AND HARNESS RODS SHALL BE IN ACCORDANCE WITH THESE ENGINEERING STANDARDS.

2.) ALL WATER MAINS TWELVE (12") INCHES OR SMALLER, WHICH CROSS UNDER DISTRICT CONDUITS SHALL BE DUCTILE IRON.

3.) A BORED CROSSING MAY BE REQUIRED BY THE ENGINEER.

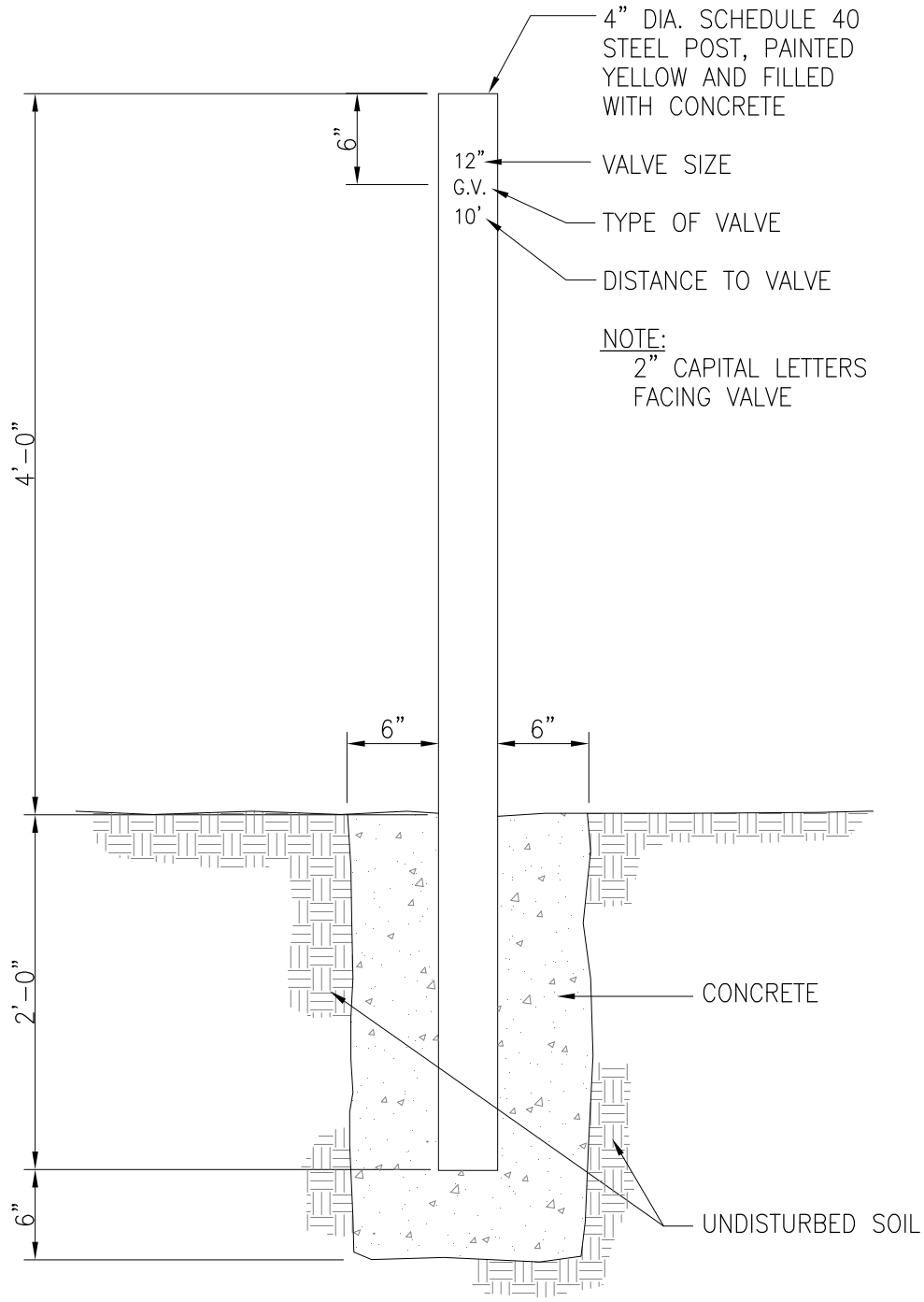
	STANDARDS & SPECIFICATIONS	REVISED:	UTILITY CROSSING
DATE:		DRAWING NO. 200-37	



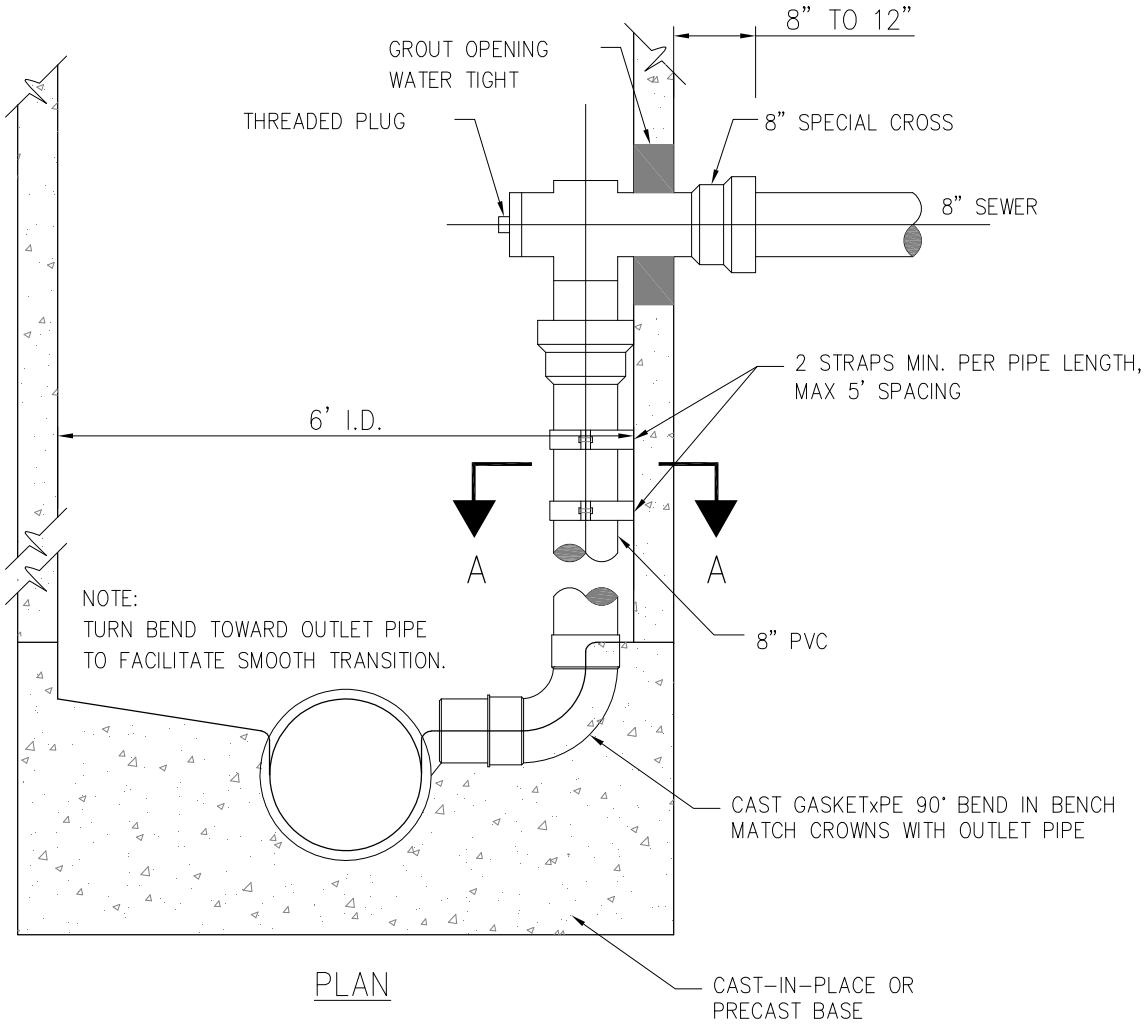
NOTES:

1. GATE VALVES SHALL OPEN CCW AND BE RESILIENT SEAT MEETING REQUIREMENTS OF AWWA C509.
2. FITTINGS SHALL BE WRAPPED WITH 8 MIL MINIMUM THICKNESS POLYETHYLENE SHEETING.
3. VALVE BOX TOP SHALL BE SET 1/2" BELOW FINAL ASPHALT PAVEMENT GRADE.
4. PROVIDE MARKER POST WHERE NECESSARY.

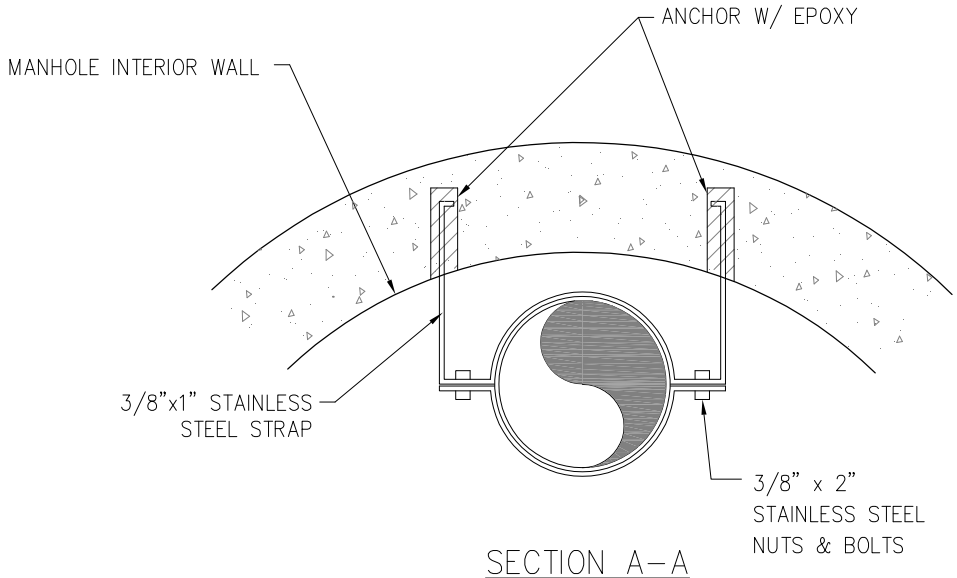
	STANDARDS & SPECIFICATIONS	REVISED:	VALVE BOX DETAIL
DATE:		DRAWING NO. 200-38	



	STANDARDS & SPECIFICATIONS	REVISED:	VALVE MARKER POST
DATE:		DRAWING NO. 200-39	

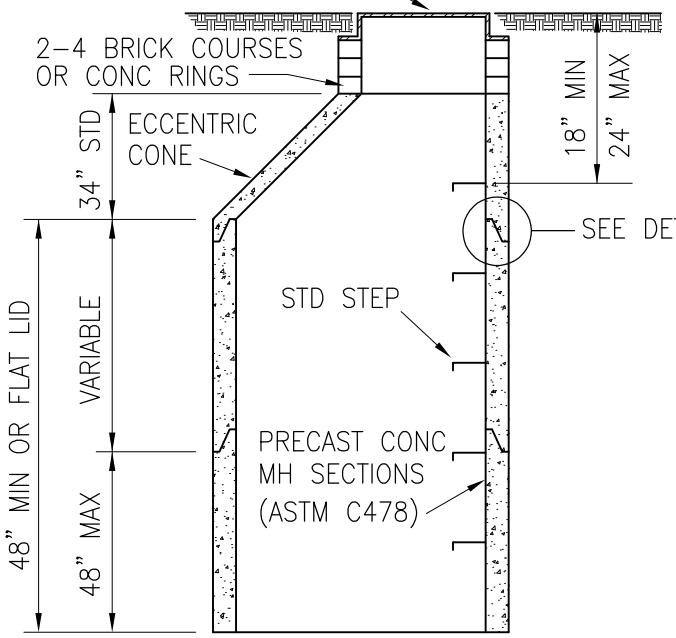


PLAN

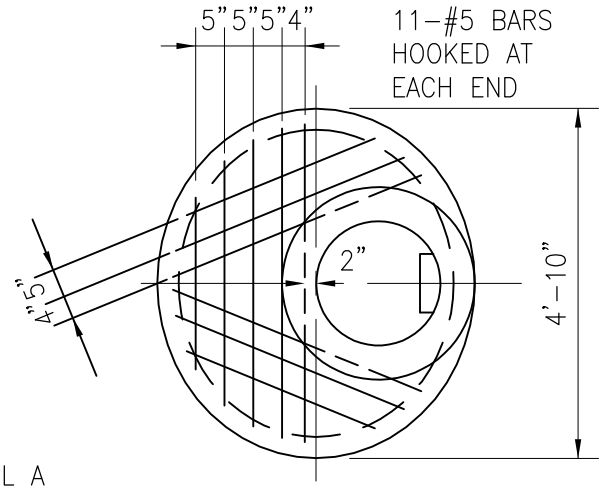


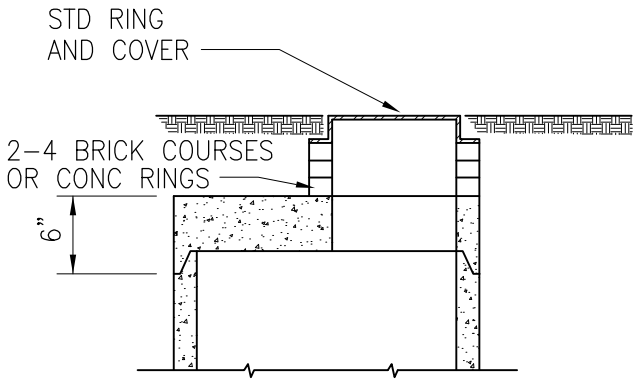
SECTION A-A

	STANDARDS & SPECIFICATIONS	REVISED:	INSIDE DROP MANHOLE
DATE:		DRAWING NO. 300-01	



ELEVATION

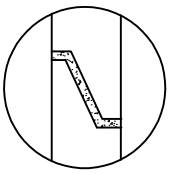




ALTERNATE FLAT LID

NOTE:

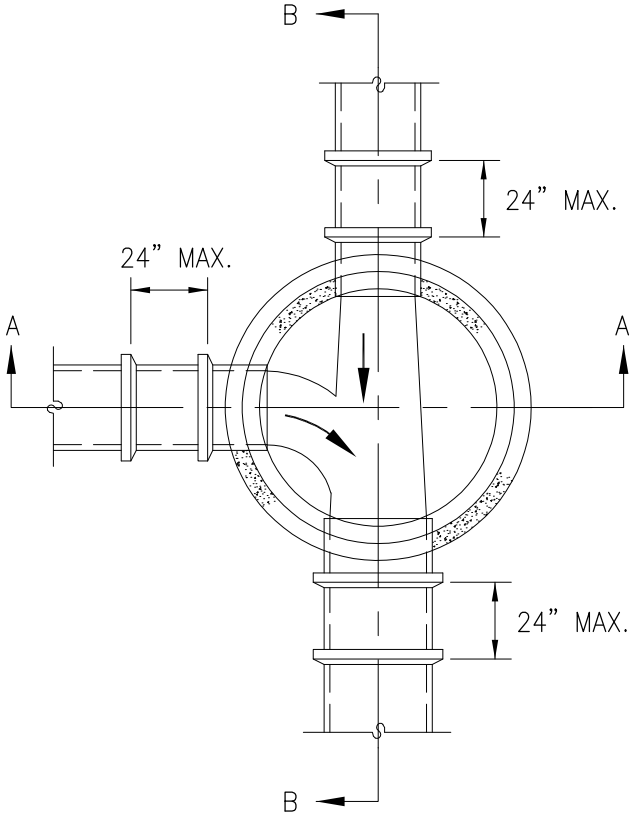
1. STEPS SHALL BE LOCATED ABOVE THE EXIT PIPE IN A STRAIGHT LINE, 12" ON CENTER (O.C.) VERTICALLY.
2. 60" DIA. MANHOLES SHALL HAVE A 30" STANDARD RING AND COVER, J–MARK NO. J–1361 OR APPROVED EQUAL.
3. 48" DIA. MANHOLES SHALL HAVE A 24" STANDARD RING AND COVER, J–MARK NO. J–1161 OR APPROVED EQUAL.
4. MORTAR SHALL COVER THE LEVELING COURSES AND RING TO WITHIN 1" FROM THE SURFACE, AND SHALL BE USED ON THE INSIDE OF THE BARREL AT THE JOINTS.
5. ALL MANHOLES IN EXCESS OF 20' IN DEPTH SHALL HAVE AN INTERMEDIATE GRATING LOCATED AT THE CENTER OF THE DEPTH.
6. THE WORD "SEWER" SHALL BE BOLDLY CAST ON ALL COVERS.



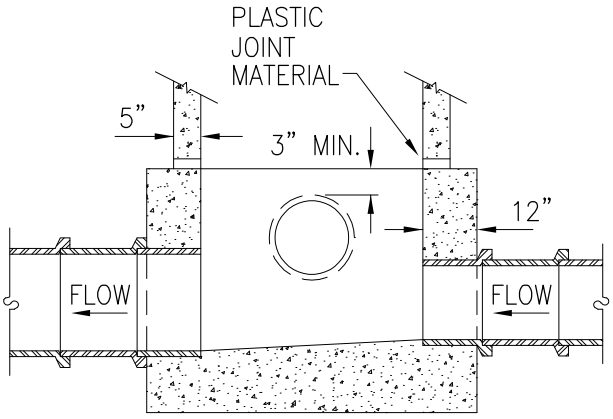
FLEXIBLE PLASTIC JOINT MATERIAL (K.T. SNYDER "RAM–NEK" OR APPROVED EQUAL)

DETAIL A

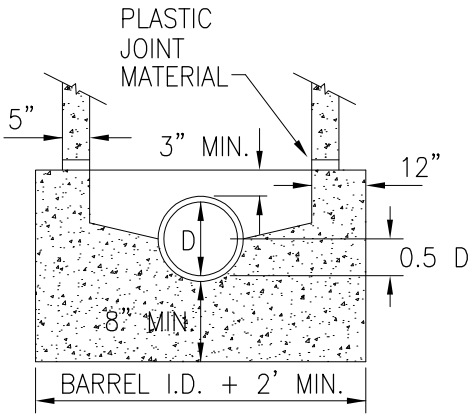
	STANDARDS & SPECIFICATIONS	REVISED:	STANDARD MANHOLE
DATE:		DRAWING NO. 300–02	



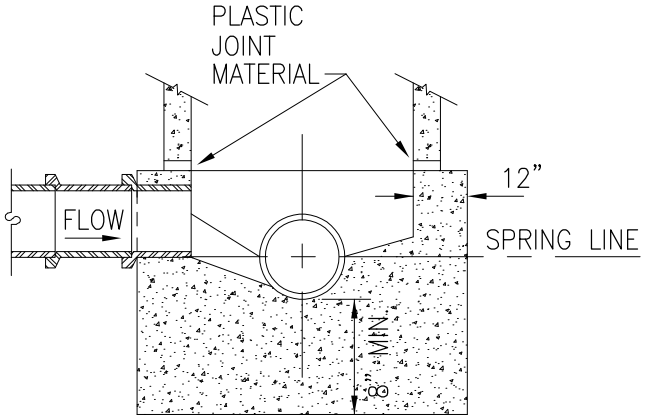
PLAN OF BASE



SECTION B



BASE DETAIL



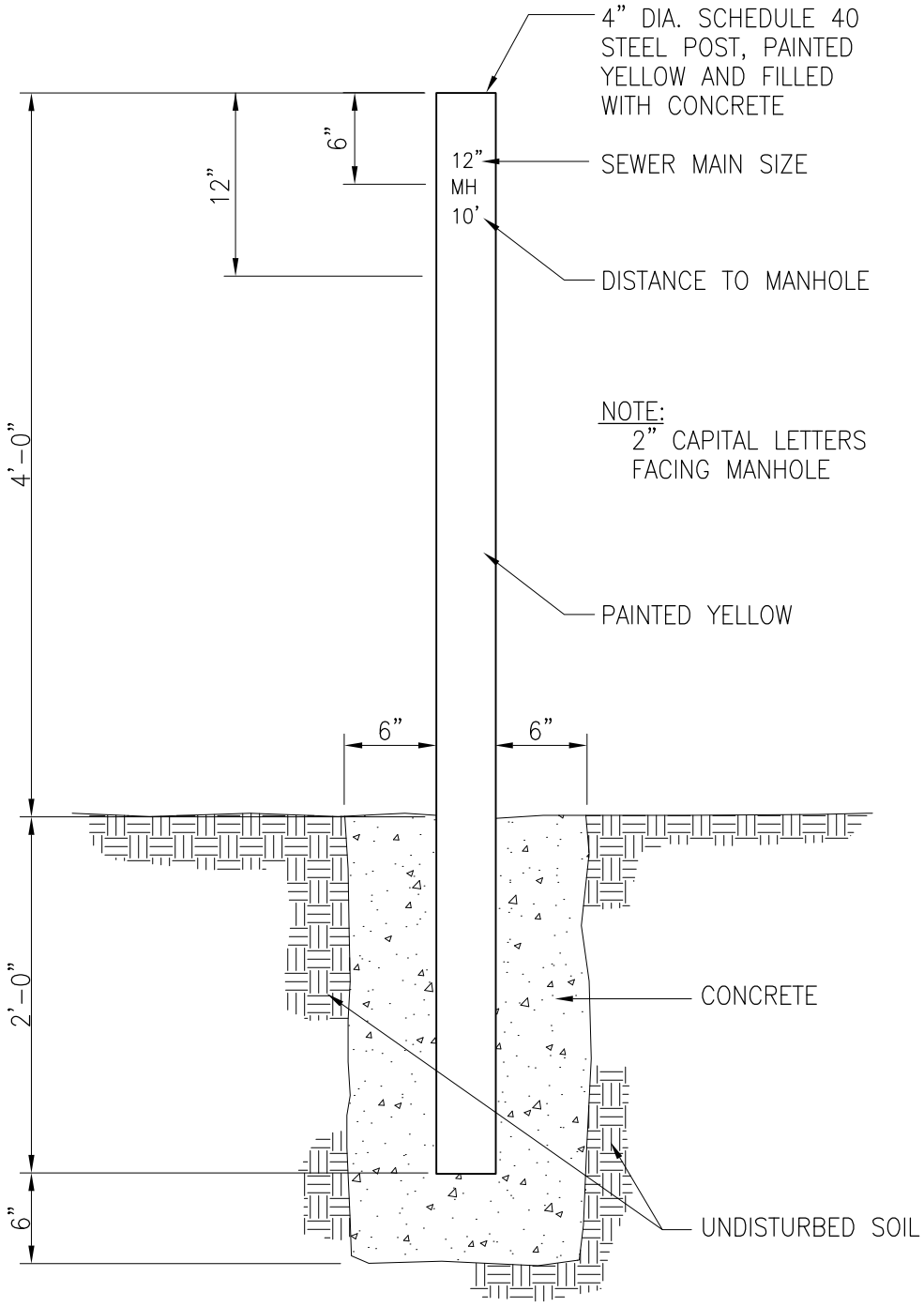
SECTION A

REINFORCE BASE WITH #4'S AT 12" E.W., OR WWF 6X6–W10 x W10 ALL 3" CLEAR FROM BOTTOM.

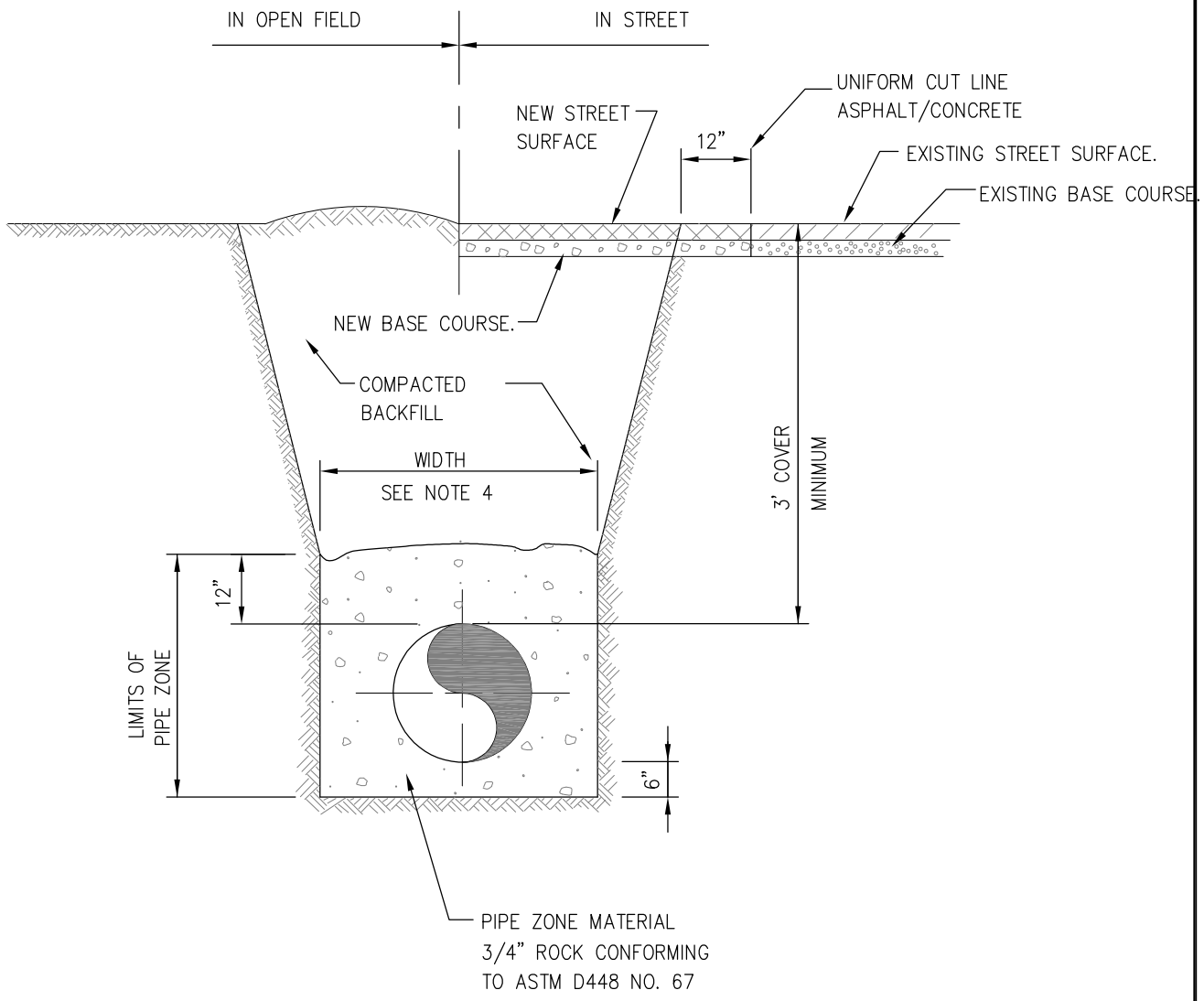
NOTE:

1. STRAIGHT SECTIONS MAY BE LAID THROUGH THE MANHOLE WITH CROWN REMOVED.
2. SECTIONS NOT LAID THROUGH THE MANHOLE SHALL DROP A MINIMUM OF 0.2'.
3. BENCHES SHALL SLOPE 2 IN/FT.
4. THERE SHALL BE A JOINT MADE AT THE EDGE OF THE MANHOLE BASE.
5. THE TOP OF THE BASE SHALL BE LEVEL IN ALL CASES.
6. SHORT STUBS SHALL BE INSTALLED ON VCP AND RCP LINES WHERE THE LINE ENTERS AND LEAVES THE BASE.

	STANDARDS & SPECIFICATIONS	REVISED:	STANDARD MANHOLE
DATE:		DRAWING NO. 300–03	

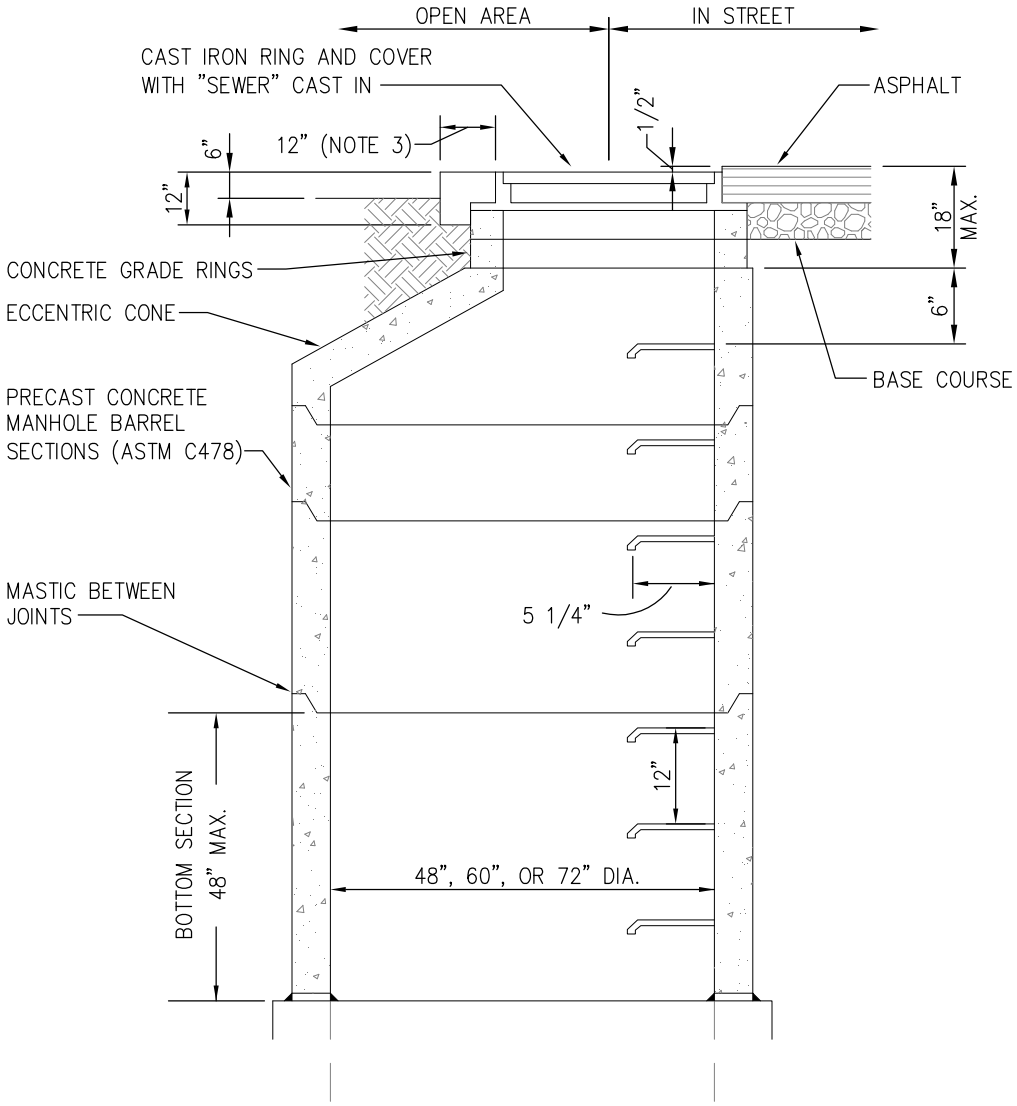


	STANDARDS & SPECIFICATIONS	REVISED:	MANHOLE MARKER POST
DATE:		DRAWING NO. 300-04	



NOTES:
1. PAVING SHALL COMPLY WITH LOCAL AUTHORITY JURISDICTION.
2. TRENCH WALLS TO BE SUPPORTED AS REQUIRED BY O.S.H.A.
3. MINIMUM COVER TO BE BELOW OFFICIAL STREET GRADE.
4. MINIMUM TRENCH WIDTH = PIPE O.D. + 12"
   MAXIMUM TRENCH WIDTH = PIPE O.D. +24"

	STANDARDS & SPECIFICATIONS	REVISED:	**SEWER TRENCH**
DATE:		DRAWING NO. 300–05	

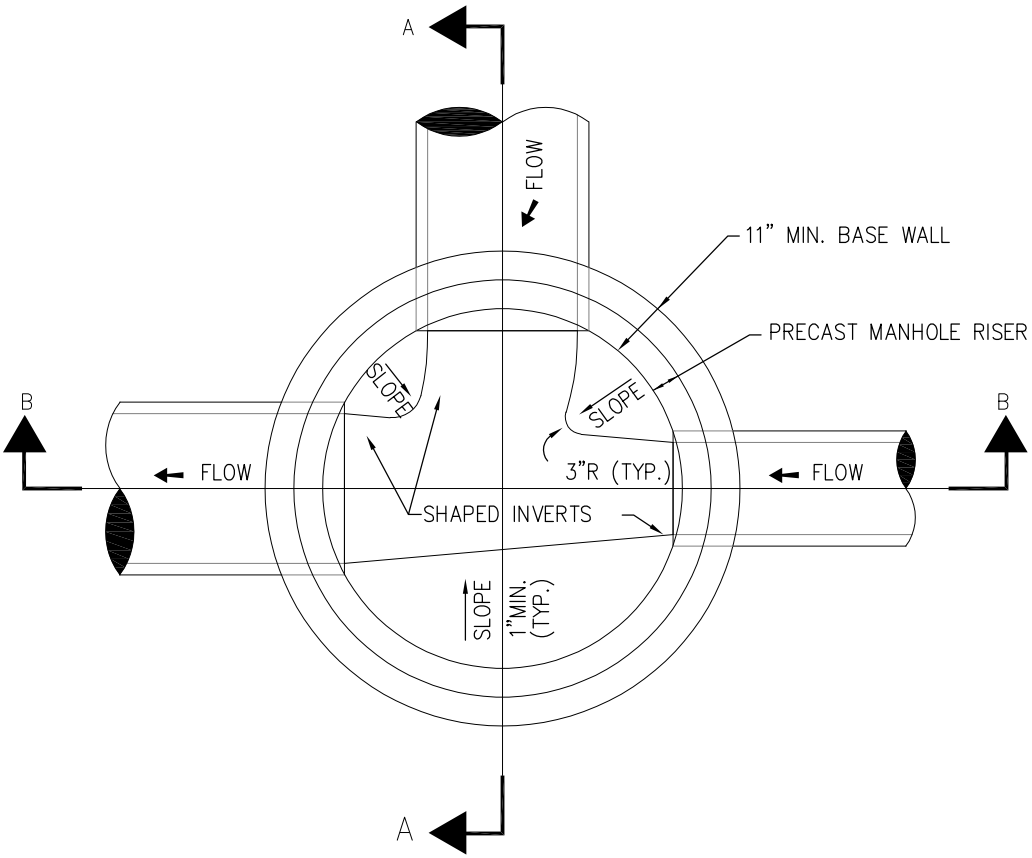


TYPICAL MANHOLE SECTION WITH ECCENTRIC CONE

NOTES:

1. ALL JOINTS TO BE RUBBERNEK OR RAMNEK IF ABOVE THE WATER TABLE, FLEXIBLE PLASTIC SEALING COMPOUND IF BELOW THE WATER TABLE, AS PER SPECIFICATION.
2. ALL JOINTS SHALL BE DOUBLE SEALED WITH FLEXIBLE PLASTIC JOINT SEALING MATERIAL TO EXTRUDE INTO MANHOLE, AND BE TRIMMED OFF.
3. ALL MANHOLES PLACED IN THE "OPEN SPACE" AREAS SHALL BE INSTALLED WITH THE RING AND COVER AT AN ELEVATION THAT IS 6" ABOVE FINAL GRADE WITH A COLLAR OF CONCRETE. A MARKER POST SHALL BE INSTALLED NEAR BY. SEE MARKER POST DETAIL.
4. STEPS INSTALLED OVER DOWNSTREAM INVERT OF MANHOLE.
5. 60" OR LARGER DIAMETER MANHOLES REQUIRE A 30" OPENING.
6. SEE EITHER CAST-IN-PLACE OR PRECAST MANHOLE BASE DETAIL
7. ALL COVERS TO BE CASTINGS, INC. J-1161 FOR 24" OPENING OR J-1361 FOR 30" OPENINGS.
8. RING AND COVER SHALL BE CASTINGS J-1161 FOR 24" AND J-1361 FOR 30".
9. AVOID 12" HIGH BARREL SECTIONS

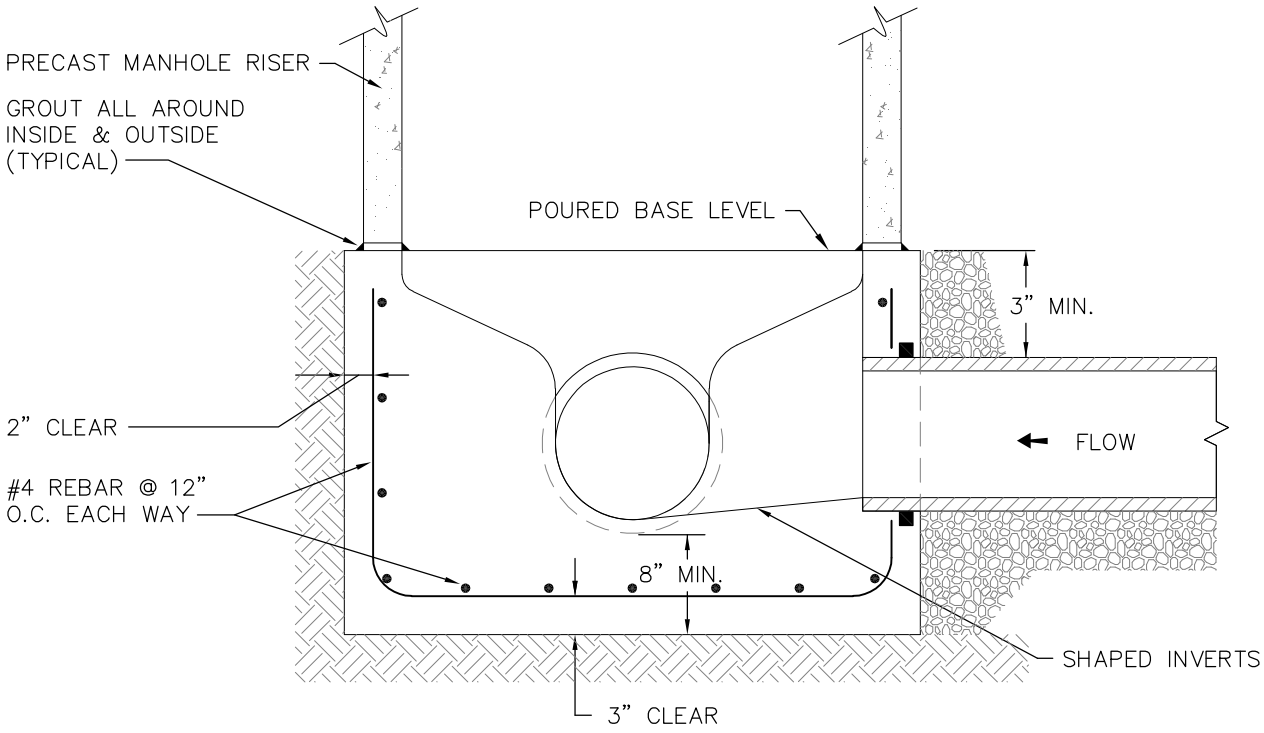
	STANDARDS & SPECIFICATIONS	REVISED:	MANHOLE RISER
DATE:		DRAWING NO. 300-06	



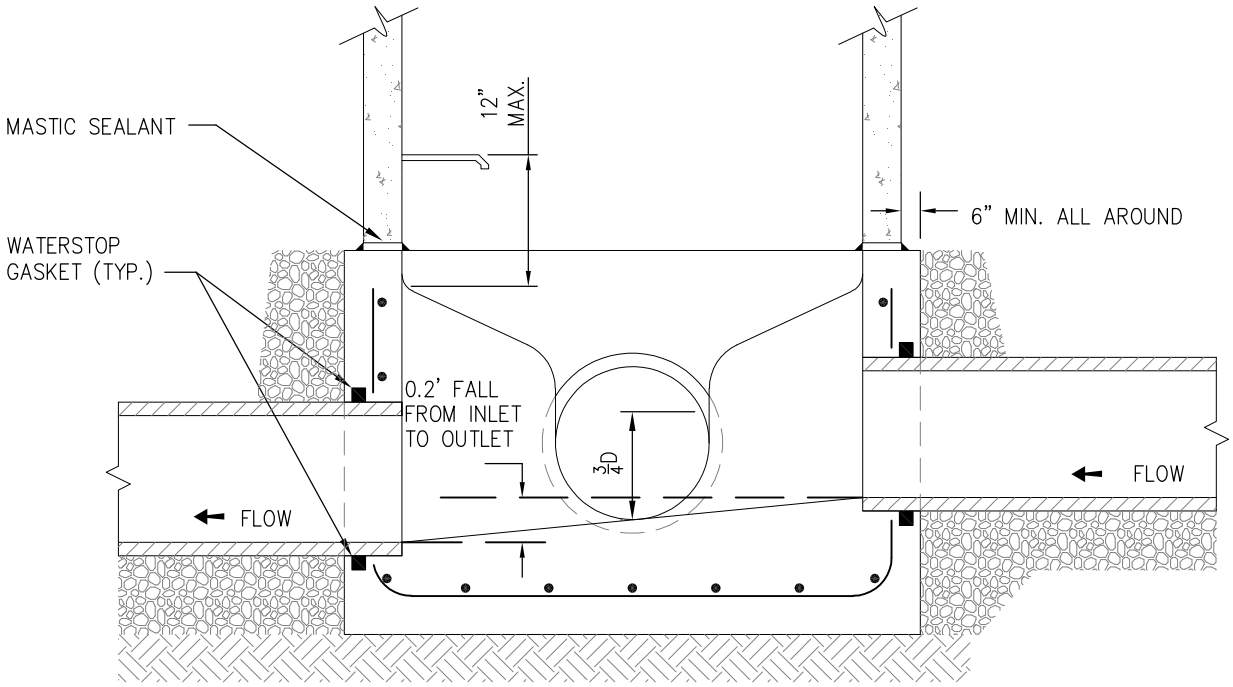
NOTES:

1. MANHOLE SHALL HAVE EITHER CAST-IN-PLACE REINFORCED CONCRETE BASE OR PRECAST BASE.
2. SQUARE BASES ARE ACCEPTABLE (IF APPROVED BY AUTHORITY).
3. SEE STANDARD PLAN FOR SECTIONS A-A AND B-B.

	STANDARDS & SPECIFICATIONS	REVISED:	MANHOLE BASE
DATE:		DRAWING NO. 300-07	

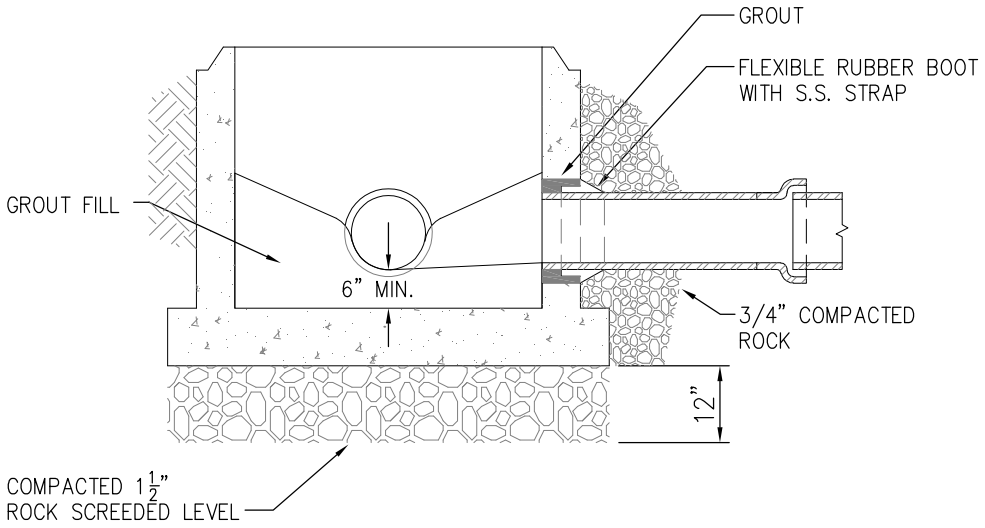


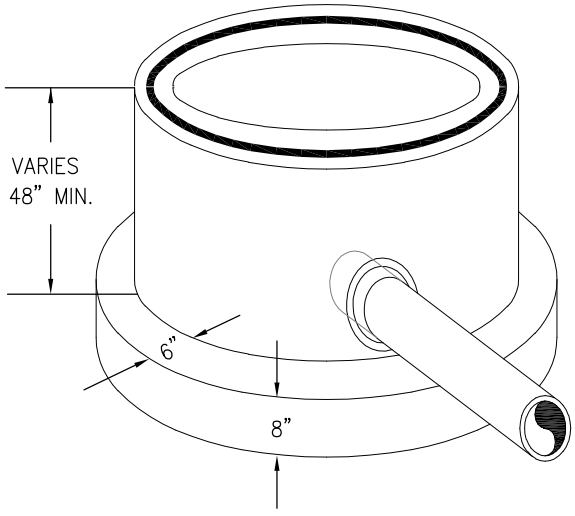
SECTION A–A



SECTION B–B
NTS

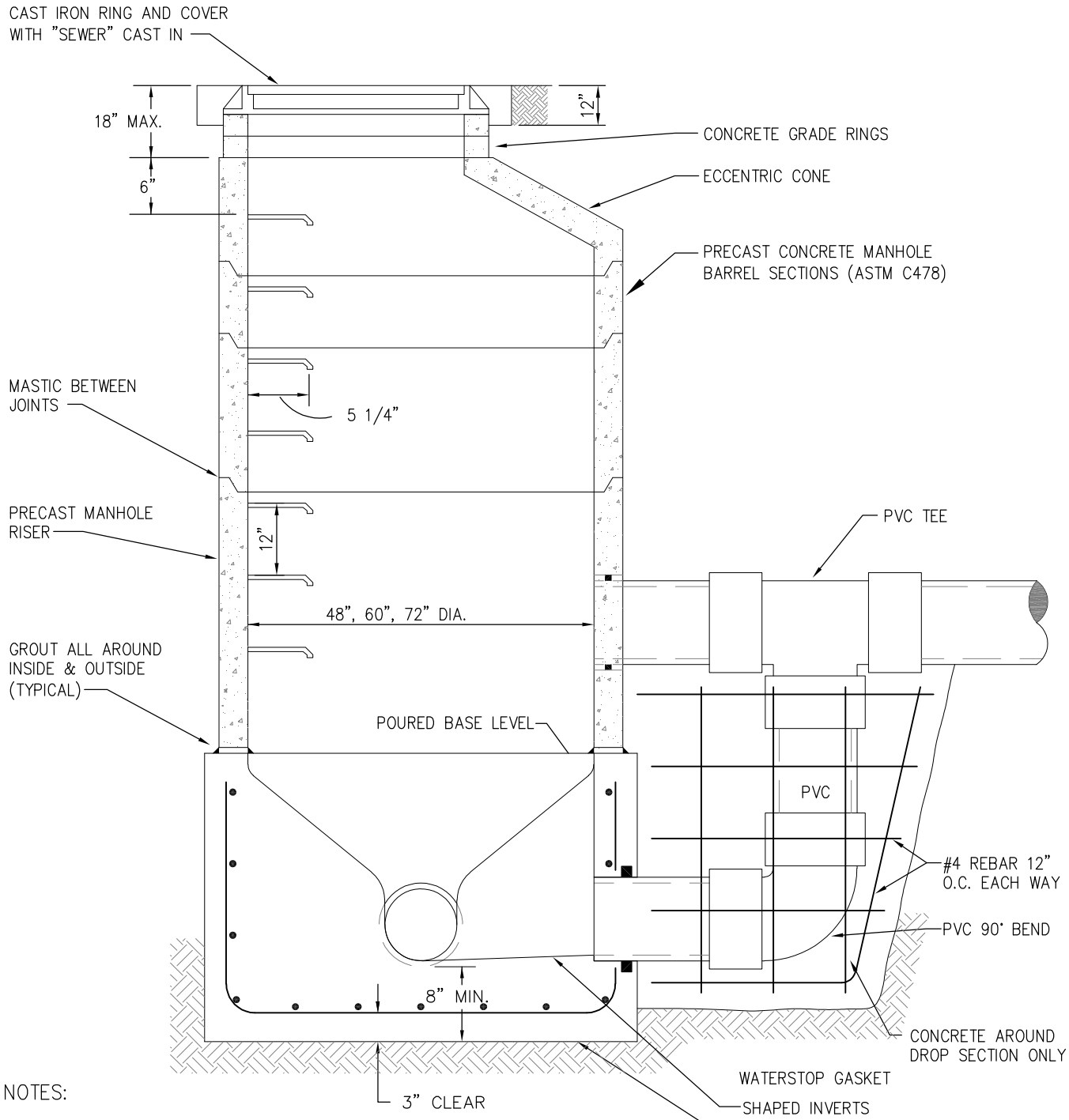
	STANDARDS & SPECIFICATIONS	REVISED:	CAST-IN-PLACE MANHOLE BASE
DATE:		DRAWING NO. 300–08	





*NOTE: 1) PREPOURED INVERTS ARE NOT ALLOWED
2) AVOID 12" BARREL SECTIONS.

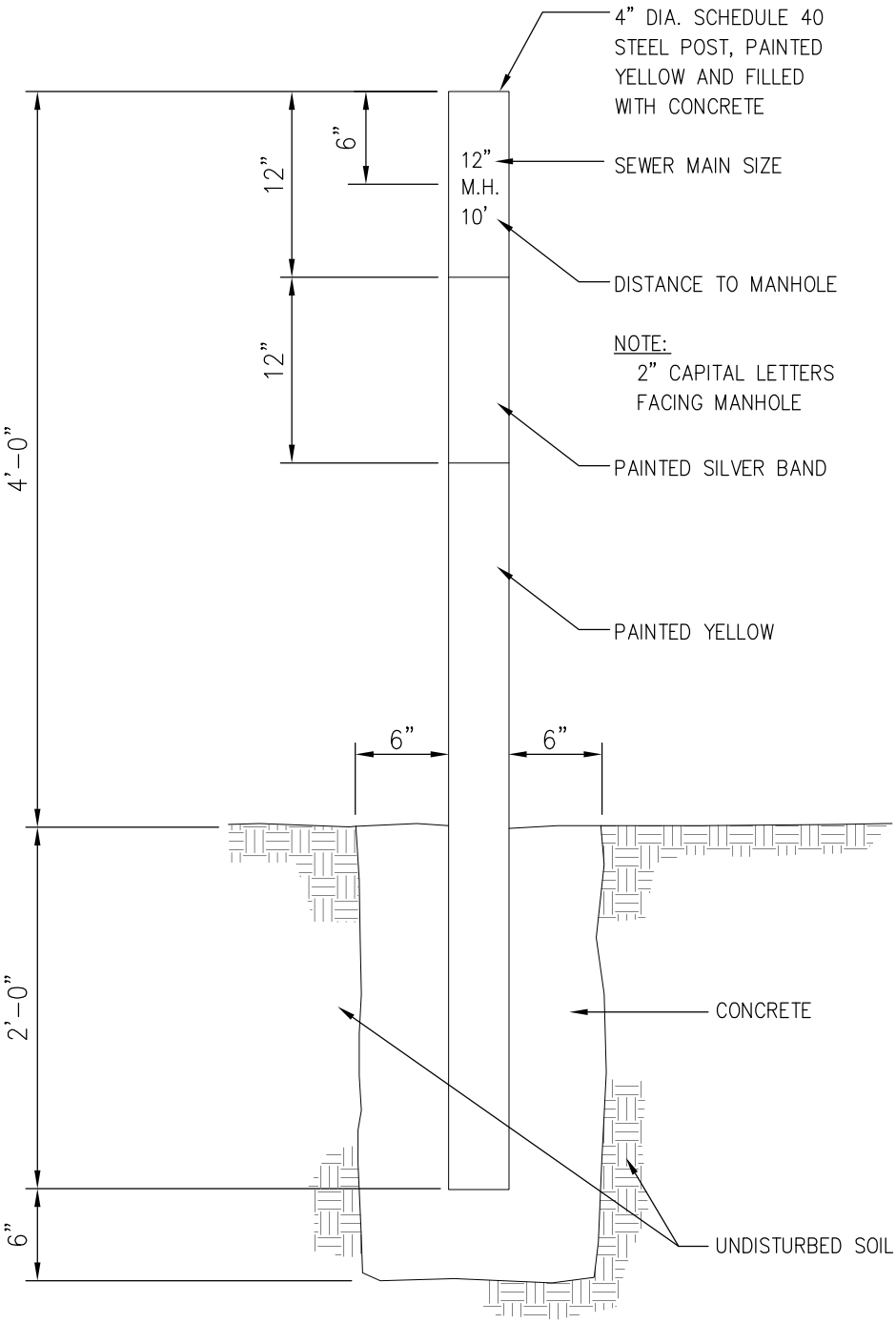
	STANDARDS & SPECIFICATIONS	REVISED:	PRECAST CONCRETE MANHOLE BASE
DATE:		DRAWING NO. 300-09	



NOTES:

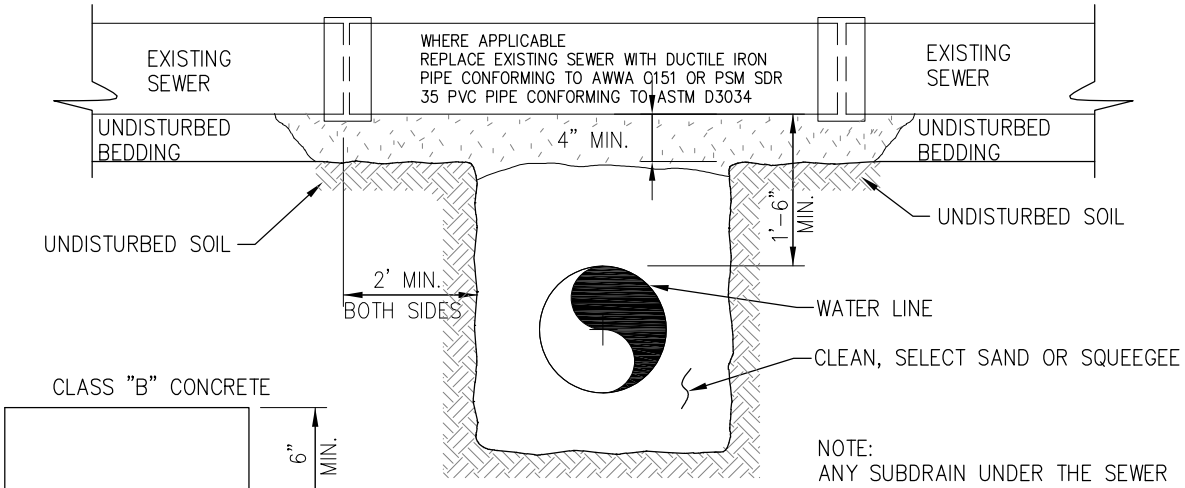
1. SEE MANHOLE REINFORCEMENT DETAIL FOR BASE.
2. STEPS INSTALLED OVER DOWNSTREAM INVERT OF MANHOLE.

	STANDARDS & SPECIFICATIONS	REVISED:	OUTSIDE DROP MANHOLE
DATE:	DRAWING NO. 300-10		

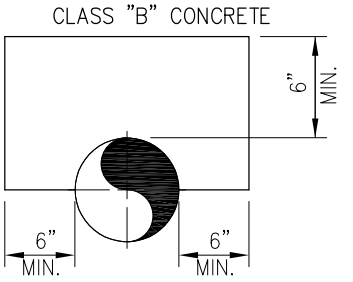


NOTE:
PROVIDE ONLY IF MANHOLE NOT IN TRAVELED WAY

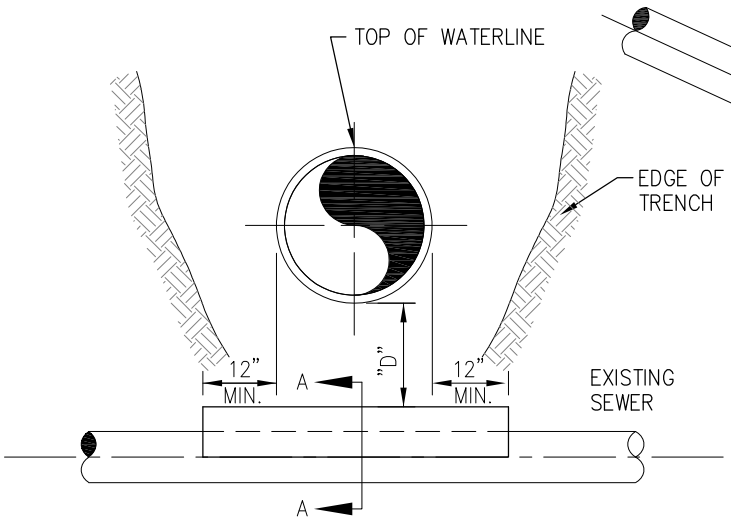
	STANDARDS & SPECIFICATIONS	REVISED:	MANHOLE MARKER POST
DATE:		DRAWING NO. 300-11	



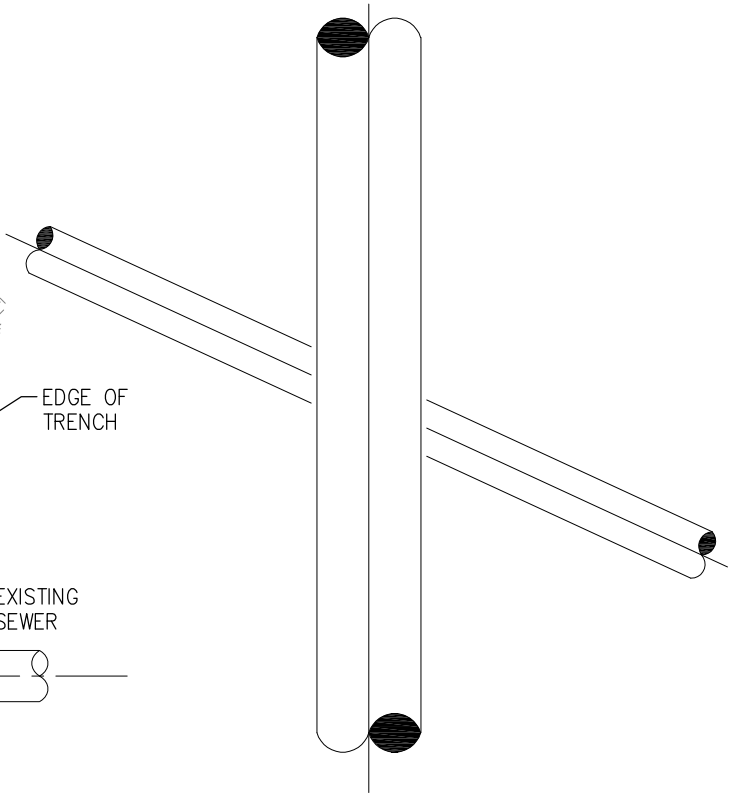
NOTE:
ANY SUBDRAIN UNDER THE SEWER SHALL BE REPLACED SUCH THAT NO FLOW SHALL ENTER THE WATER LINE TRENCH.



SECTION A–A



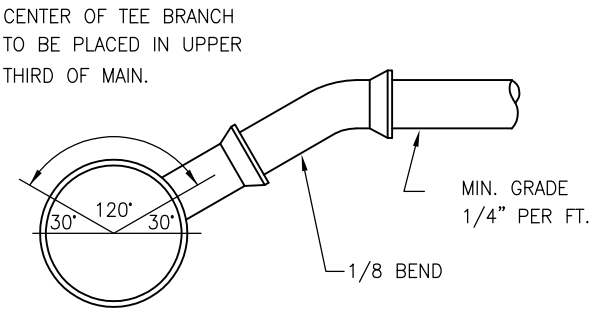
WITH "D" LESS THAN 2'



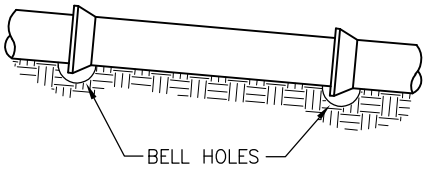
SEWER CROSSING PLAN

NOTE:
ALL EXISTING SEWER DAMAGED DURING INSTALLATION MUST BE REPLACED WITH PVC PIPE.

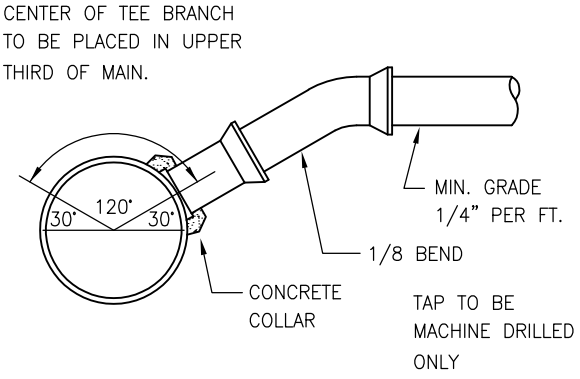
	STANDARDS & SPECIFICATIONS	REVISED:	STORM SEWER AND SANITARY SEWER CROSSING
DATE:		DRAWING NO. 300–12	



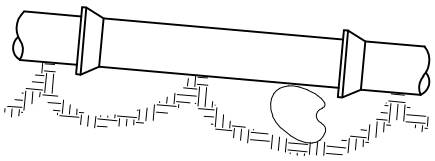
1/8 BEND CONNECTION TO TEE



ACCEPTABLE BEDDING



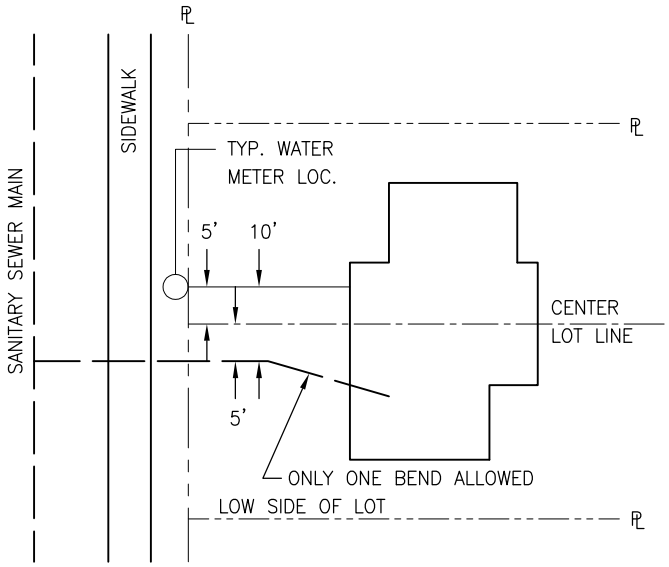
1/8 BEND & SADDLE CONNECTION



UNACCEPTABLE BEDDING

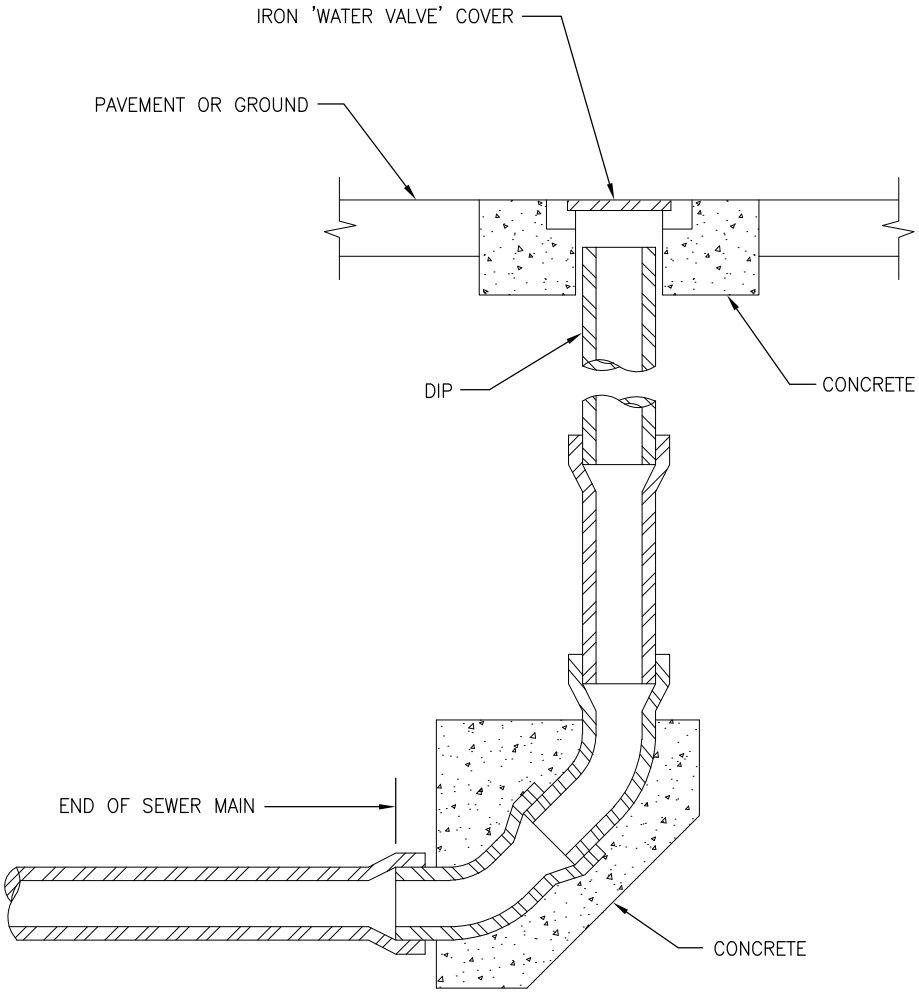
NOTES:

1. BELLS SHALL NOT TOUCH THE SIDES OR BOTTOM OF THE BELL HOLE.
2. THE BARREL SECTION SHALL BE SUPPORTED THROUGHOUT ITS LENGTH.
3. SERVICE TAPS SHALL BE IN-LINE TEE OR MACHINE TAPPED. HAND TAPS SHALL NOT BE ALLOWED.
4. SERVICE LINES SHALL BE LOCATED 5' DOWNHILL FROM CENTERLINE OF THE LOT AND A MINIMUM OF 10' FROM THE WATER SERVICE LINE.
5. THE MIN. SERVICE LINE GRADE SHALL BE 1/4" PER FT.
6. JOINTS SHALL BE WATER TIGHT.
7. WHEN SERVICE STUB-INS ARE INSTALLED WITH THE SEWER MAIN, THEY SHALL BE EXTENDED AT LEAST TO PROPERTY LINE AND SHALL BE PLUGGED WITH A 2x4 MARKER FOR LOCATION OF END.



SEWER SERVICE

	STANDARDS & SPECIFICATIONS	REVISED:	SANITARY SEWER SERVICE
DATE:		DRAWING NO. 300-13	



TERMINAL CLEANOUT

NOTES:

NOT A WMD STANDARD DETAIL

SIX INCH PRIVATE SEWERS ONLY!

ACCEPTABLE PIPE TYPES – VCP, PVC, DIP

	STANDARDS & SPECIFICATIONS	REVISED:	TYPICAL CLEANOUT
DATE:		DRAWING NO. 300–14	

INCREMENTAL RAINFALL DEPTH/RETURN PERIOD

	BASINS LESS THAN 5 SQ MILES					BASINS BETWEEN 5 AND 10 SQ MILES					BASINS BETWEEN 10 AND 20 SQ MILES				
TIME (MIN)	2 YR (IN)	5 YR (IN)	10 YR (IN)	50 YR (IN)	100 YR (IN)	2 YR (IN)	5 YR (IN)	10 YR (IN)	50 YR (IN)	100 YR (IN)	2 YR (IN)	5 YR (IN)	10 YR (IN)	50 YR (IN)	100 YR (IN)
5	0.02	0.03	0.03	0.03	0.03	0.02	0.03	0.03	0.03	0.03	0.02	0.03	0.03	0.03	0.03
10	0.04	0.05	0.06	0.08	0.08	0.04	0.05	0.06	0.08	0.08	0.04	0.05	0.06	0.08	0.08
15	0.08	0.12	0.14	0.12	0.12	0.08	0.12	0.14	0.12	0.12	0.08	0.12	0.14	0.12	0.12
20	0.16	0.22	0.25	0.19	0.22	0.15	0.21	0.25	0.19	0.22	0.14	0.20	0.25	0.19	0.22
25	0.25	0.36	0.42	0.35	0.38	0.24	0.35	0.40	0.34	0.36	0.23	0.32	0.38	0.32	0.34
30	0.14	0.10	0.20	0.59	0.68	0.13	0.17	0.19	0.57	0.65	0.13	0.16	0.18	0.53	0.61
35	0.06	0.08	0.09	0.28	0.38	0.06	0.08	0.09	0.27	0.36	0.06	0.08	0.09	0.25	0.34
40	0.05	0.06	0.07	0.19	0.22	0.05	0.06	0.07	0.19	0.22	0.05	0.06	0.07	0.19	0.22
45	0.03	0.05	0.06	0.12	0.17	0.03	0.05	0.06	0.12	0.17	0.03	0.05	0.06	0.12	0.17
50	0.03	0.05	0.05	0.12	0.14	0.03	0.05	0.05	0.12	0.14	0.03	0.05	0.05	0.12	0.14
55	0.03	0.04	0.05	0.08	0.11	0.03	0.04	0.05	0.08	0.11	0.03	0.04	0.05	0.08	0.11
60	0.03	0.04	0.05	0.08	0.11	0.03	0.04	0.05	0.08	0.11	0.03	0.04	0.05	0.08	0.11
65	0.03	0.04	0.05	0.08	0.11	0.03	0.04	0.05	0.08	0.11	0.03	0.04	0.05	0.08	0.11
70	0.02	0.04	0.05	0.06	0.05	0.02	0.04	0.05	0.06	0.05	0.02	0.04	0.05	0.06	0.05
75	0.02	0.03	0.05	0.06	0.05	0.02	0.03	0.05	0.06	0.05	0.02	0.03	0.05	0.06	0.05
80	0.02	0.03	0.04	0.04	0.03	0.02	0.03	0.04	0.04	0.03	0.02	0.03	0.04	0.04	0.03
85	0.02	0.03	0.03	0.04	0.03	0.02	0.03	0.03	0.04	0.03	0.02	0.03	0.03	0.04	0.03
90	0.02	0.03	0.03	0.03	0.03	0.02	0.03	0.03	0.03	0.03	0.02	0.03	0.03	0.03	0.03
95	0.02	0.03	0.03	0.03	0.03	0.02	0.03	0.03	0.03	0.03	0.02	0.03	0.03	0.03	0.03
100	0.02	0.02	0.03	0.03	0.03	0.02	0.03	0.03	0.03	0.03	0.02	0.03	0.03	0.03	0.03
105	0.02	0.02	0.03	0.03	0.03	0.02	0.02	0.03	0.03	0.03	0.02	0.02	0.03	0.03	0.03
110	0.02	0.02	0.03	0.03	0.03	0.02	0.02	0.03	0.03	0.03	0.02	0.02	0.03	0.03	0.03
115	0.01	0.02	0.03	0.03	0.03	0.01	0.02	0.03	0.03	0.03	0.01	0.02	0.03	0.03	0.03
120	0.01	0.02	0.02	0.03	0.03	0.01	0.02	0.02	0.03	0.03	0.01	0.02	0.02	0.03	0.03
125											0.01	0.02	0.02	0.02	0.02
130											0.01	0.01	0.02	0.02	0.02
135											0.01	0.02	0.01	0.02	0.02
140											0.01	0.02	0.01	0.02	0.02
145											0.01	0.01	0.01	0.02	0.02
150											0.01	0.01	0.01	0.01	0.02
155											0.01	0.01	0.01	0.01	0.01
160											0.01	0.01	0.01	0.01	0.01
165											0.01	0.01	0.01	0.01	0.01
170											0.01	0.01	0.01	0.01	0.01
175											0.01	0.01	0.01	0.01	0.01
180											0.01	0.01	0.01	0.00	0.00
TOTAL	1.15	1.61	1.89	2.72	3.12	1.12	1.58	1.86	2.60	3.05	1.22	1.68	1.97	2.76	3.14

N.T.S.

STANDARDS & SPECIFICATIONS

REVISED:

DESIGN STORMS

DATE:

DRAWING NO. 400–01

DURATION DURATION FACTORS	5 MIN 0.29		10 MIN 0.45		15 MIN 0.57		30 MIN 0.79		60 MIN 1.00	
FREQUENCY	DEPTH (IN)	INTEN (IN/HR)	DEPTH (IN)	INTEN (IN/HR)	DEPTH (IN)	INTEN (IN/HR)	DEPTH (IN)	INTEN (IN/HR)	DEPTH (IN)	INTEN (IN/HR)
2 YR	0.29	3.48	0.45	2.70	0.57	2.28	0.79	1.58	1.00	1.00
5 YR	0.41	4.92	0.64	3.84	0.81	3.24	1.12	2.24	1.42	1.42
10 YR	0.49	5.83	0.76	4.56	0.96	3.84	1.33	2.66	1.68	1.68
50 YR	0.68	8.16	1.06	6.36	1.34	5.36	1.86	3.72	2.35	2.35
100 YR	0.79	9.43	1.22	7.32	1.54	6.16	2.14	4.28	2.71	2.71

NOTE:

1. DEPTH AT EACH DURATION = ONE HOUR RAINFALL DEPTH x RESPECTIVE DURATION
2. SEE FIGURE 400-6 FOR GRAPH OF THESE VALUES

N.T.S.

	STANDARDS & SPECIFICATIONS	REVISED:	STORM TIME-INTENSITY-FREQUENCY
DATE:		DRAWING NO. 400-02	

PREPARED BY: _____ DATE: _____

THE DRAINAGE REPORT WITH PLAN DRAWINGS, AS NOTED BELOW HAS BEEN RECEIVED AND FOUND TO LACK THE INFORMATION NOTED. THIS INFORMATION MUST BE SUBMITTED BEFORE THE REPORT WILL BE ACCEPTED FOR REVIEW. PLEASE PROVIDE THE REQUIRED INFORMATION AND RETURN THIS CHECKLIST WITH YOUR SUBMITTAL.

SUBDIVISION: _____
LOCATION: _____
DATE SUBMITTED: _____ TYPE OF REPORT: PRELIM _____ FINAL _____
SUBMITTED BY: FIRM: _____
CONTACT: _____ PHONE: _____
SUBMITTED DATE: (1) _____ (2) _____ (3) _____ (4) _____
DATE APPROVED: _____

CHECKLIST

ITEM	DESCRIPTION	RECEIVED OR NOT APPLICABLE	TO BE SUBMITTED
1.	TYPED, BOUND REPORT		
2.	PROFESSIONAL ENGINEERS CERTIFICATE		
3.	GENERAL LOCATION AND DESCRIPTION		
	A. LOCATION MAP		
	B. EXISTING SITE DESCRIPTION		
	C. DESCRIPTION OF EXISTING DRAINAGE PATTERNS AND FACILITIES		
4.	DRAINAGE BASINS AND SUB-BASINS		
	A. MAJOR BASIN DESCRIPTION		
	B. SUB-BASIN DESCRIPTION		
5.	DESIGN CRITERIA		
	A. DEVELOPMENT MASTER PLAN DISCUSSION		
	B. HYDROLOGIC CRITERIA DISCUSSION		
	C. HYDRAULIC CRITERIA DISCUSSION		
6.	DRAINAGE FACILITY DESIGN		
	A. DISCUSSION OF PROPOSED FACILITIES		
	B. DISCUSSION OF DRAINAGE PATTERNS		
	C. IMPACT ON OFFSITE FACILITIES		
	D. IMPACT ON MASTER PLAN		
7.	DRAINAGE PLAN		
	A. TOPOGRAPHIC CONTOURS		
	B. R.O.W. AND EASEMENTS		
	C. DELINEATION OF BASIN AND SUB-BASINS		
	D. EXISTING DRAINAGE PATTERNS AND FACILITIES		
	E. PROPOSED DRAINAGE PATTERNS AND FACILITIES		
	F. PROPOSED OUTFALL POINTS		
	G. ROUTING OF OFFSITE DRAINAGE		
	H. ROUTING FROM SITE TO MAJOR DRAINAGE WAY		

N.T.S.

	STANDARDS & SPECIFICATIONS	REVISED:	DRAINAGE REPORT SUBMITTAL REPORT
DATE:	DRAWING NO. 400-03		

TIME OF CONCENTRATION

SUBDIVISION _____

CALCULATED BY _____ DATE _____

SUB-BASIN DATA			INITIAL/OVERLAND TIME (t_i)			TRAVEL TIME (t_t)				t_c CHECK (URBANIZED BASINS)			FINAL t_c	REMARKS
DESIGN (1)	AREA AC (2)	C_5 (3)	LENGTH FT (4)	SLOPE % (5)	t_i MIN (6)	LENGTH FT (7)	SLOPE % (8)	VEL FPS (9)	t_t MIN (10)	COMP t_c (11)	TOTAL LENGTH FT (12)	$t_c=(L/180)+10$ MIN (13)	MIN (14)	

N.T.S.

	STANDARDS & SPECIFICATIONS	REVISED:	DESIGN STORMS
DATE:		DRAWING NO. 400-04	

STORM DRAINAGE SYSTEM DESIGN
(RATIONAL METHOD PROCEDURE)

CALCULATED BY _____ JOB NO _____

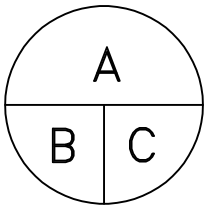
DATE _____ PROJECT _____

CHECKED BY _____ DESIGN STORM _____

STREET		DIRECT RUNOFF								TOTAL RUNOFF				STREET		PIPE			TRAVEL TIME			REMARKS
		DESIGN POINT	AREA DESIGN	AREA (AC)	RUNOFF COEFF	t_c MIN	CA (AC)	I IN/HR	Q (CFS)	t_c MIN	(CA) (AC)	I IN/HR	Q (CFS)	SLOPE %	STREET FLOW CFS	DESIGN FLOW CFS	SLOPE %	PIPE SIZE	LENGTH (FT)	VELOCITY (FPS)	t_t (MIN)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)
1																						
2																						
3																						
4																						
5																						
6																						
7																						
8																						
9																						
10																						
11																						

N.T.S.

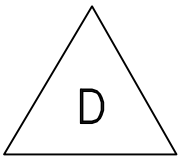
STANDARDS & SPECIFICATIONS	REVISED:	STORM DRAIN SYSTEM DESIGN
DATE:	DRAWING NO. 400–05	



A=BASIN DESIGNATION

B=AREA IN ACRES

C=COMPOSITE RUNOFF COEFFICIENTS



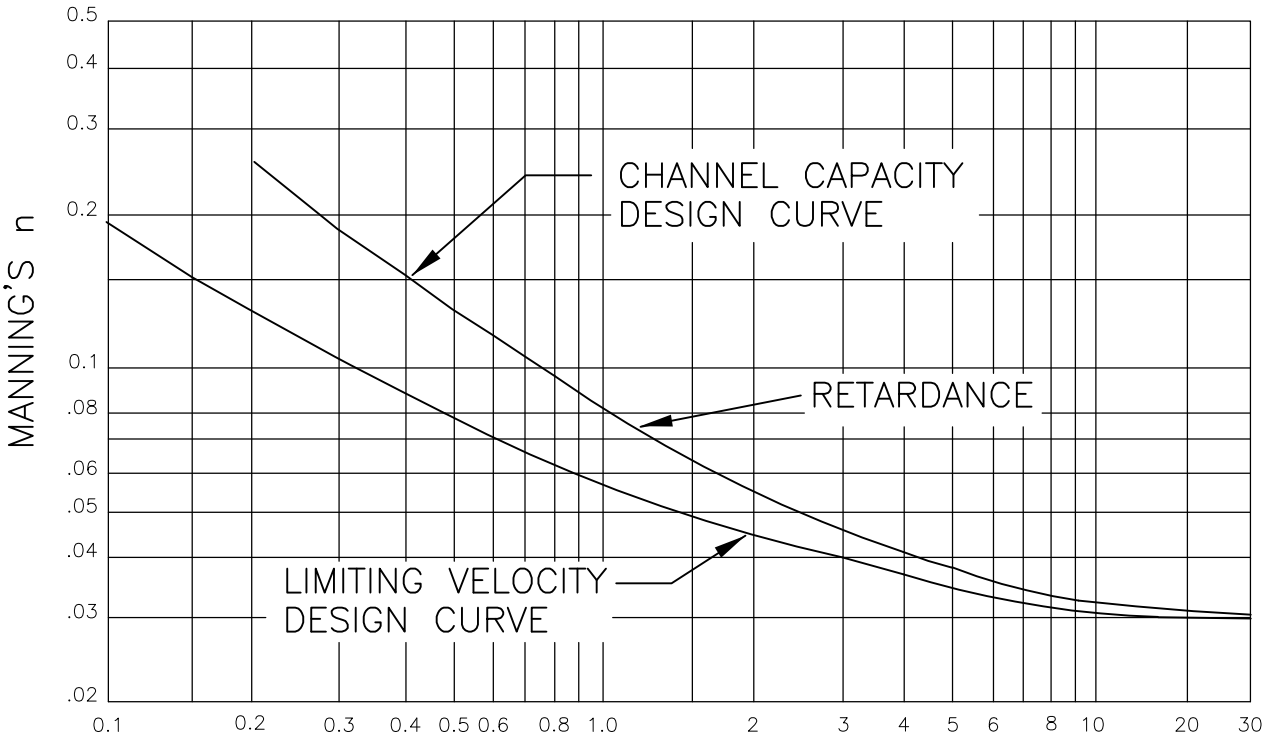
D=DESIGN POINT DESIGNATION

SUMMARY RUNOFF TABLE
(TO BE PLACED ON DRAINAGE PLAN)

DESIGN POINT	CONTRIBUTING AREA (ACRES)	RUNOFF 5YR (CFS)	PEAK 100YR (CFS)
XX	XX.XX	XX.X	XX.X

N.T.S.

	STANDARDS & SPECIFICATIONS	REVISED:	SYMBOL CRITERIA AND HYDROLOGY TABLE
DATE:	DRAWING NO. 400-06		



V_R, PRODUCT OF VELOCITY AND HYDRAULIC RADIUS

NOTE: FROM "HANDBOOK OF CHANNEL DESIGN FOR SOIL AND WATER CONSERVATION," U.S. DEPARTMENT OF AGRICULTURE, SOILS CONSERVATION SERVICE, NO. SCS–TP–61 MARCH,1947 REVISED JUNE, 1954

N.T.S.

	STANDARDS & SPECIFICATIONS	REVISED:	ROUGHNESS COEFFICIENT FOR GRASS CHANNELS
DATE:		DRAWING NO. 400–07	

DATE:

STANDARDS & SPECIFICATIONS

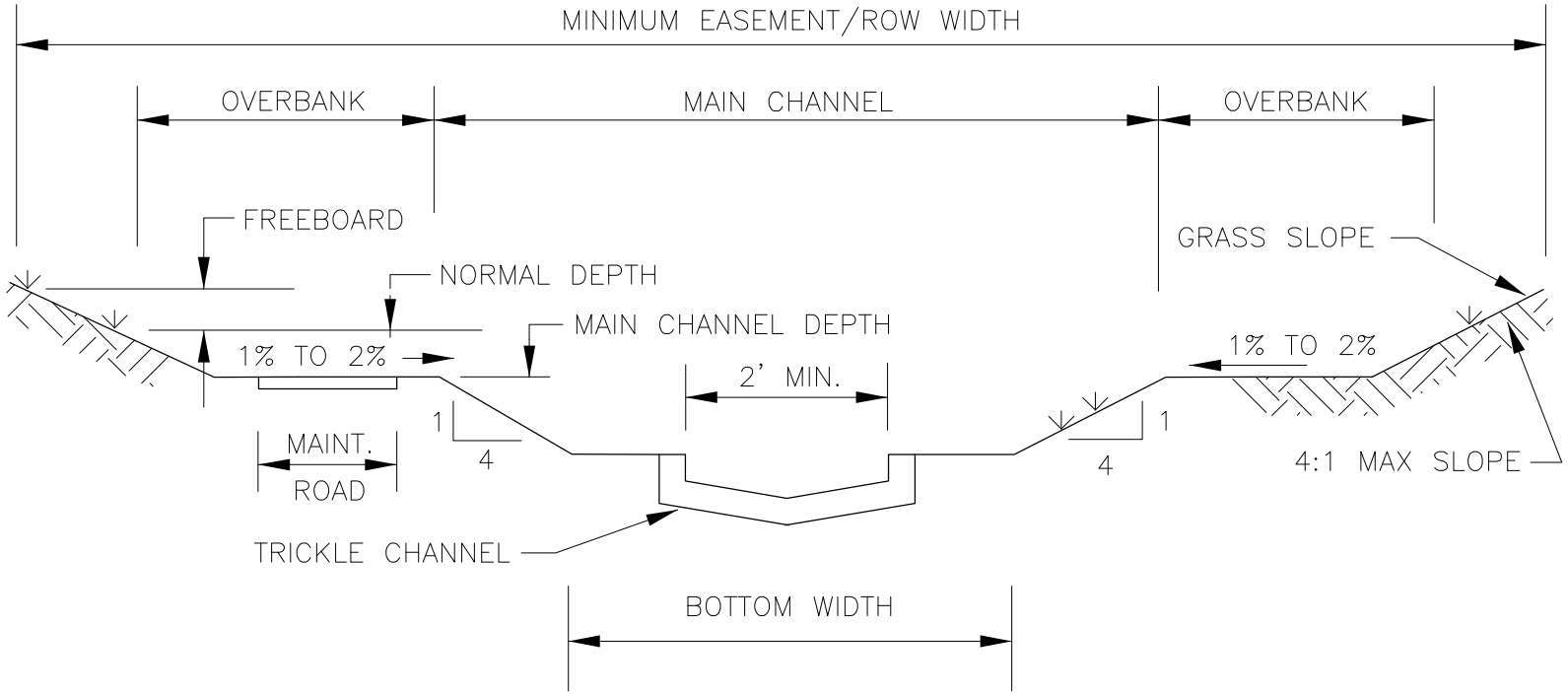
DRAWING NO. 400-08

REVISED:

TYPICAL GRASS LINED CHANNEL SECTION

N.T.S.

TYPE B



NOTE:

1. MAIN CHANNEL: CAPACITY TO BE NO LESS THAN 20% OF 100-YEAR AT MAIN CHANNEL DEPTH. MAXIMUM 100-YEAR FLOW VELOCITY IS 7 FPS.

2. TRICKLE CHANNEL: MINIMUM CAPACITY TO BE 1% TO 3% OF 100-YEAR FLOW BUT NOT LESS THAN 1 CFS. CHANNEL TO BE CONSTRUCTED OF CONCRETE, GROUTED RIPRAP OR OTHER MATERIALS APPROVED BY THE CITY ENGINEER. SEE FIGURE 400-16 FOR REQUIREMENTS IN SANDY SOILS.

3. NORMAL DEPTH: FLOW DEPTH FOR 100-YEAR FLOW SHALL NOT EXCEED 5 FEET.

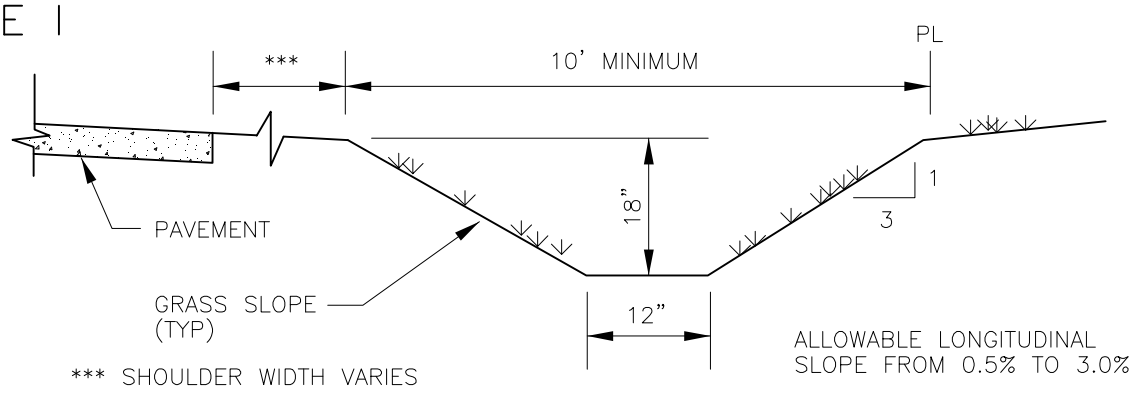
4. FREEBOARD: FREEBOARD TO BE A MINIMUM OF 1 FOOT.

5. MAINTENANCE ACCESS ROAD: MINIMUM WIDTH TO BE 12 FEET. CITY MAY REQUIRE ALL OR PART OF THE ROAD TO BE SURFACED.

6. EASEMENT/ROW WIDTH: MINIMUM WIDTH TO INCLUDE FREEBOARD AND MAINTENANCE ACCESS ROAD.

7. OVERBANK: FLOW IN EXCESS OF MAIN CHANNEL TO BE CARRIED IN THIS AREA. AREA MAY BE USED FOR RECREATION PURPOSES.

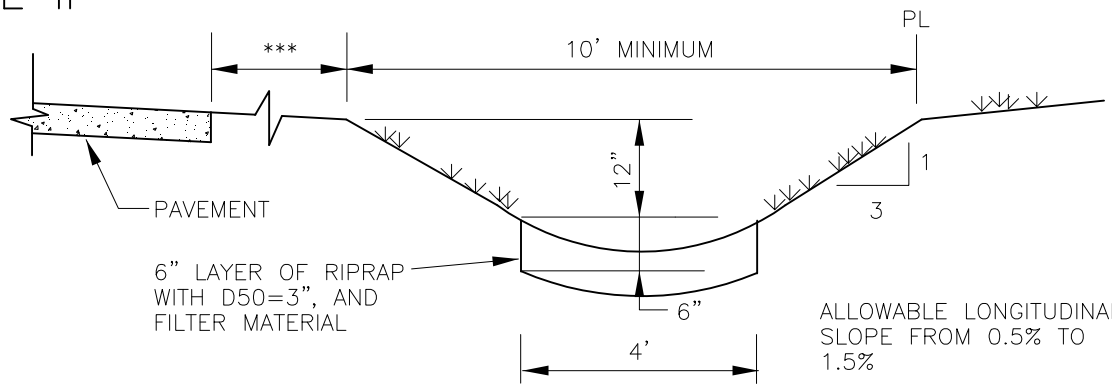
TYPE I



*** SHOULDER WIDTH VARIES

ALLOWABLE LONGITUDINAL SLOPE FROM 0.5% TO 3.0%

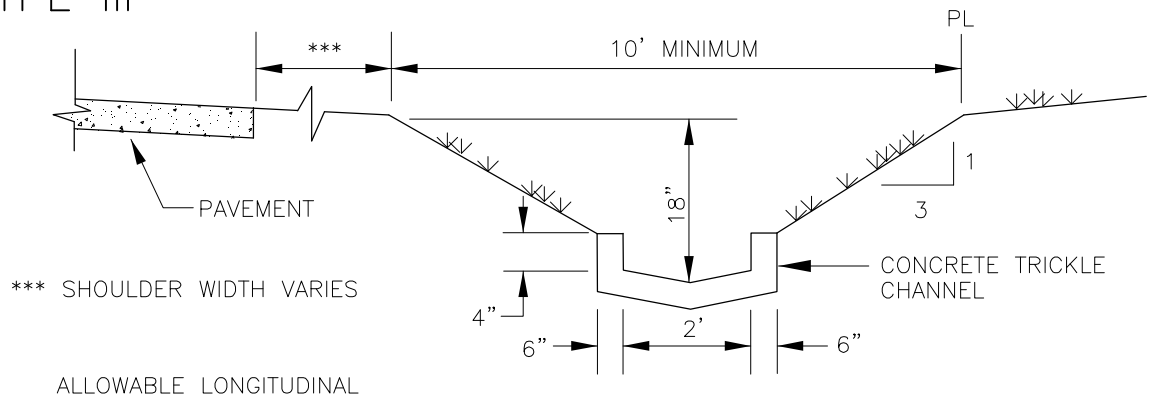
TYPE II



*** SHOULDER WIDTH VARIES

ALLOWABLE LONGITUDINAL SLOPE FROM 0.5% TO 1.5%

TYPE III



*** SHOULDER WIDTH VARIES

ALLOWABLE LONGITUDINAL SLOPE LESS THAN 0.5%

NOTE:

1. SEE FIGURE 400–_ FOR CAPACITY OF ROADSIDE DITCH.
2. FOR STREET SLOPES GREATER THAN MAXIMUM ALLOWABLE, CHECK DROPS (2' MAXIMUM HEIGHT) WILL BE REQUIRED.

N.T.S.

	STANDARDS & SPECIFICATIONS	REVISED:	ROADSIDE DITCH SECTIONS
DATE:		DRAWING NO. 400–09	

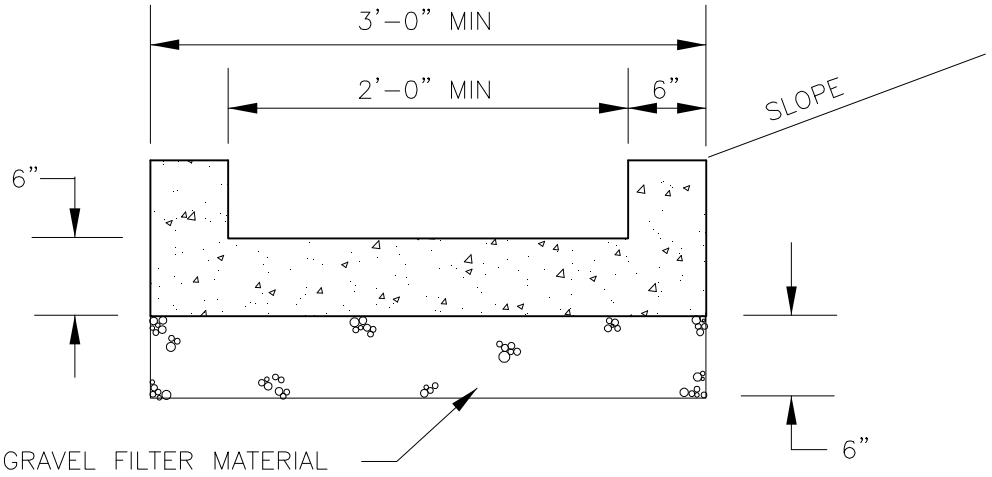
	DITCH TYPE I		DITCH TYPE II		DITCH TYPE III	
SLOPE (%)	VEL. (FPS)	Q (CFS)	VEL. (FPS)	Q (CFS)	VEL. (FPS)	Q (CFS)
0.5	1.4	4	2.2	14	4.1	28
1.0	2.5	11	3.3	20	NOT PERMITTED	
1.5	3.4	20	NOT PERMITTED		NOT PERMITTED	
2.0	4.3	26	NOT PERMITTED		NOT PERMITTED	
2.5	5.0	32	NOT PERMITTED		NOT PERMITTED	
3.0 (4)	5.7	37	NOT PERMITTED		NOT PERMITTED	

NOTES:

1. SEE FIGURE 400–17 FOR GEOMETRY OF ROADSIDE DITCH
2. VELOCITY IS BASED UPON THE SCS RETARDANCE CURVE "D". SEE FIGURE 400–13.
3. CAPACITY IS BASED UPON THE SCS RETARDANCE CURVE "C". SEE FIGURE 400–13.
4. MAXIMUM PERMISSIBLE SLOPE FOR ROADSIDE DITCH IS 3.0%. SLOPE LIMITATION IS BASED ON A MAXIMUM FROUDE NUMBER OF 0.8 FOR TYPE I AND II AND 0.9 FOR TYPE III DITCH.
5. LINEARLY INTERPOLATE FOR INTERMEDIATE SLOPES.

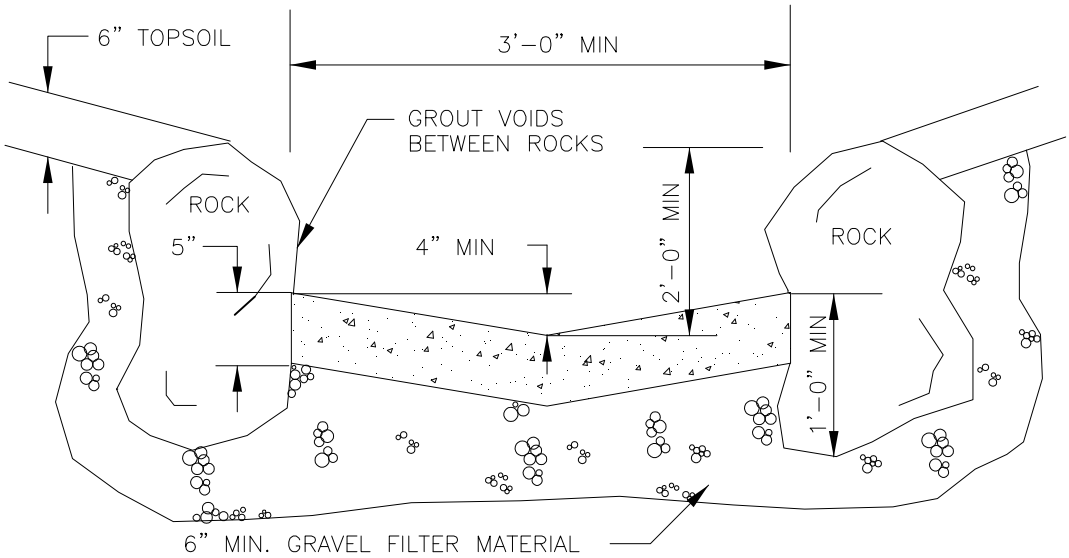
N.T.S.

	STANDARDS & SPECIFICATIONS	REVISED:
DATE:	DRAWING NO. 400–10	ROADSIDE DITCH CAPACITIES



RECTANGULAR CHANNEL SECTION

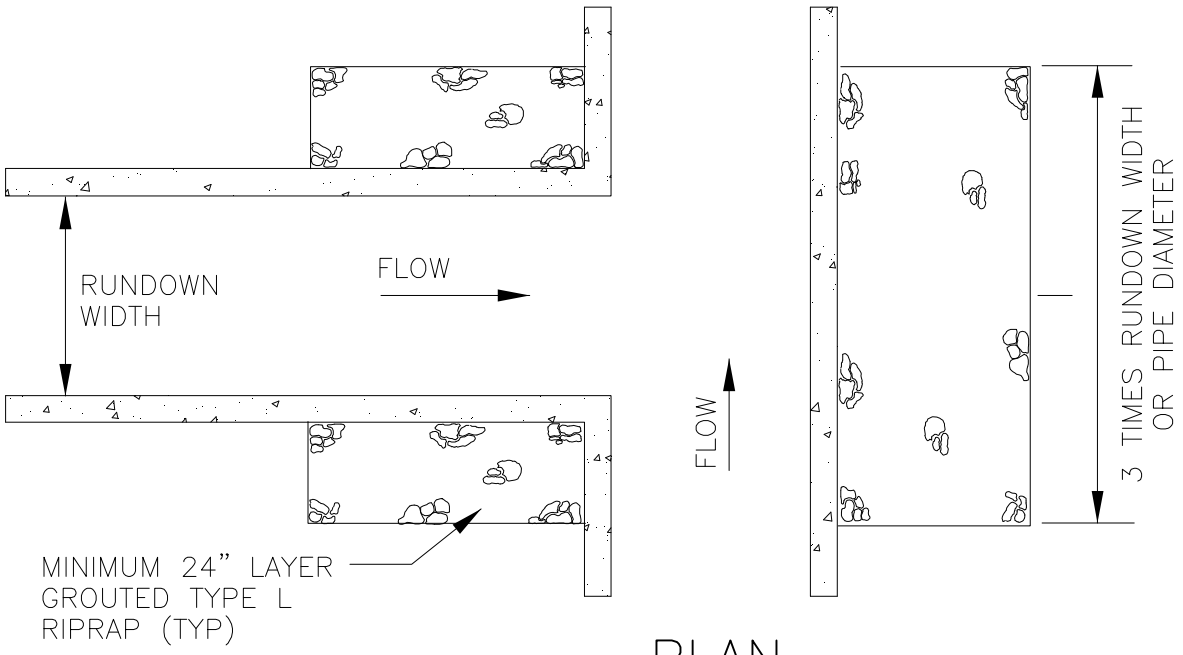
NOTE: CONCRETE TO BE REINFORCED WITH FIBERMESH PER MANUFACTURERS SPECIFICATIONS



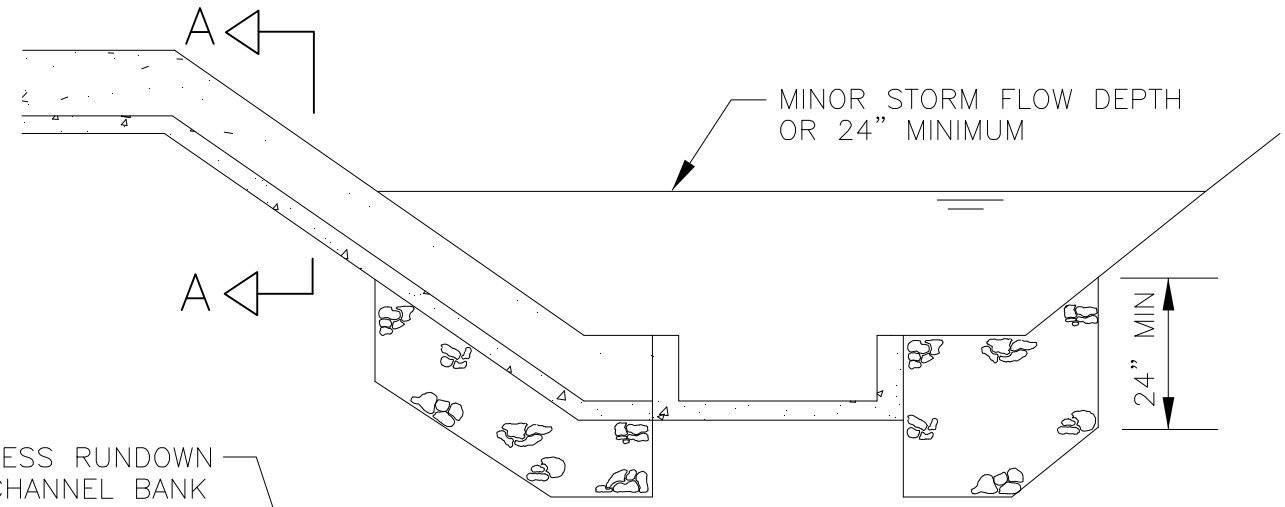
COMBINATION CHANNEL SECTION

N.T.S.

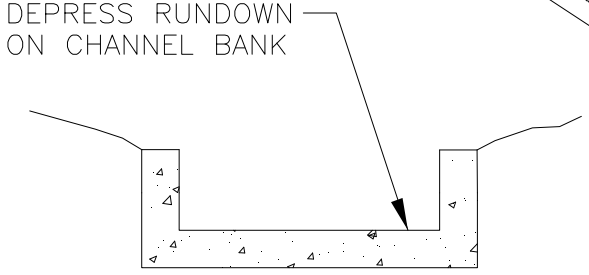
	STANDARDS & SPECIFICATIONS	REVISED:	TRICKLE CHANNEL DETAILS
DATE:		DRAWING NO. 400–11	



PLAN



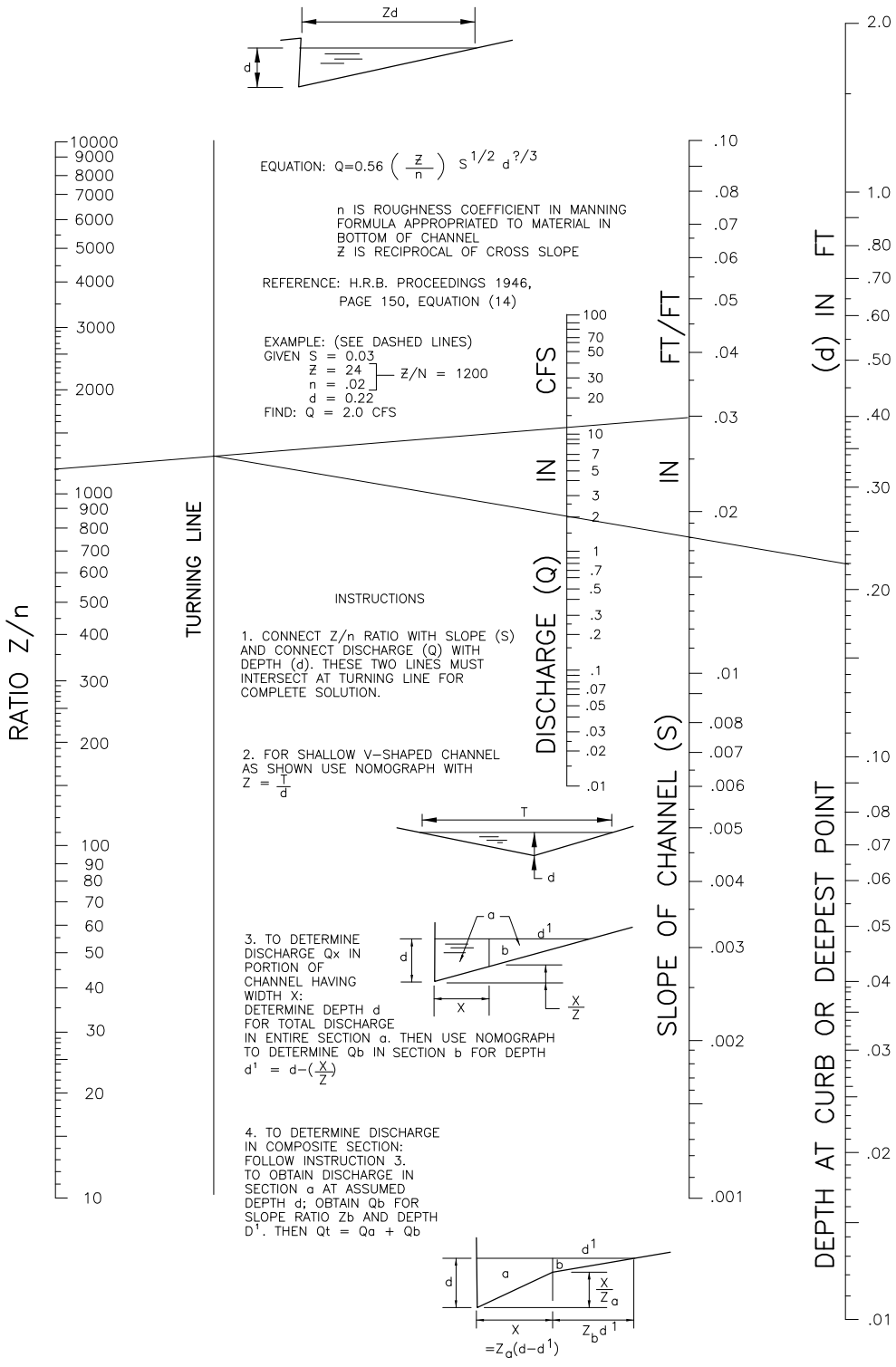
PROFILE



SECTION A–A

N.T.S.

	STANDARDS & SPECIFICATIONS	REVISED:	CHANNEL RUNDOWN
DATE:		DRAWING NO. 400–12	



N.T.S.

	STANDARDS & SPECIFICATIONS	REVISED:	NOMOGRAPH FOR FLOW IN TRIANGULAR GUTTERS
DATE:		DRAWING NO. 400-13	

REDUCTION FACTOR FOR ALLOWABLE GUTTER CAPACITY LOCAL AND COLLECTOR STREETS

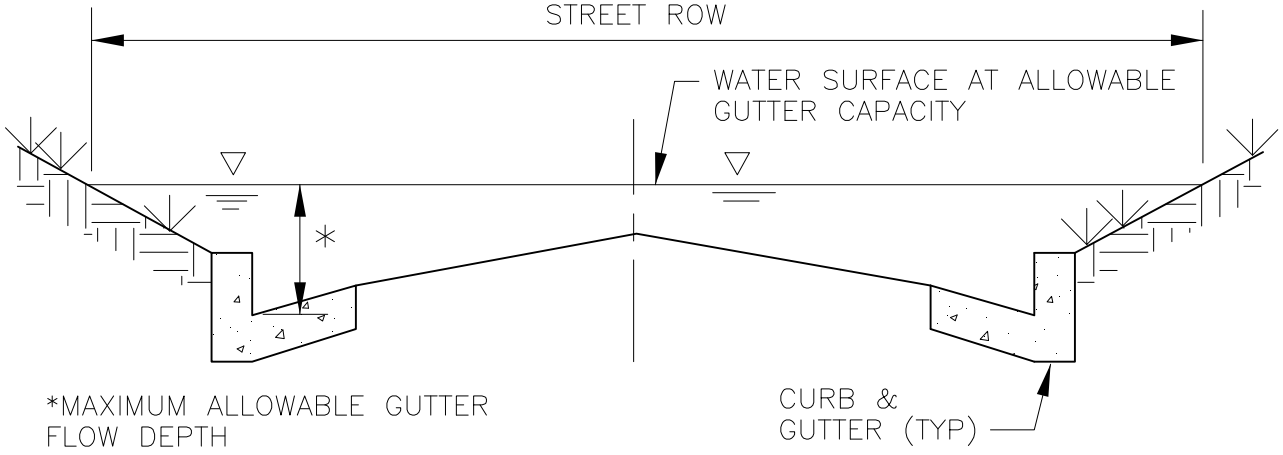
REDUCTION FACTOR FOR ALLOWABLE GUTTER CAPACITY WHEN APPROACHING AN ARTERIAL STREET

APPLY REDUCTION FACTOR FOR APPLICABLE SLOPE TO THE THEORETICAL GUTTER CAPACITY TO OBTAIN ALLOWABLE GUTTER CAPACITY APPROACHING ARTERIAL STREET

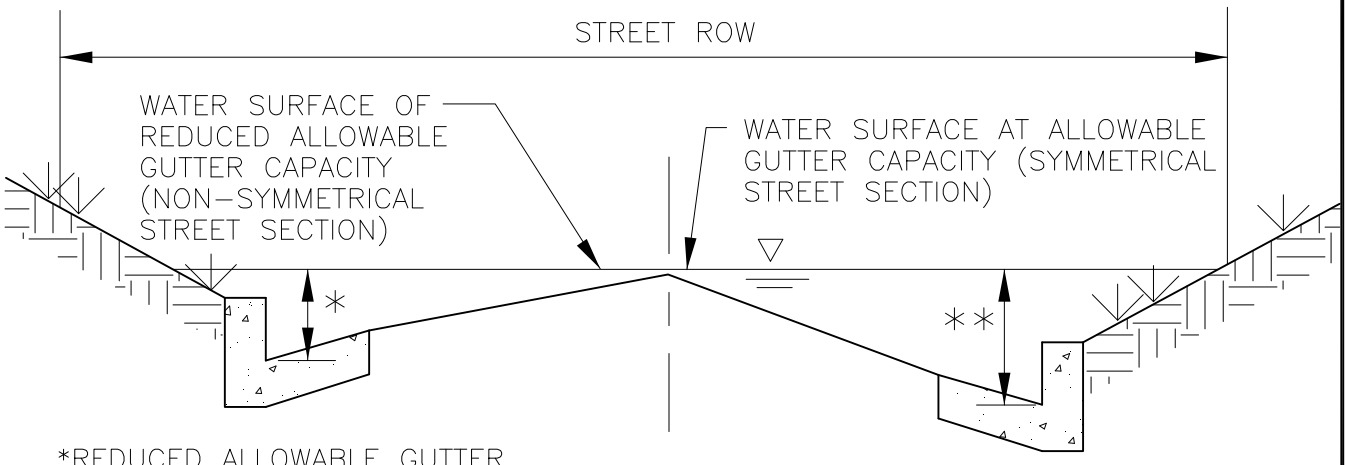
N.T.S.

	STANDARDS & SPECIFICATIONS	REVISED:
DATE:	DRAWING NO. 400–14	**GUTTER CAPACITY REDUCTION CURVES**

MAJOR STORM



(A) SYMMETRICAL STREET SECTION



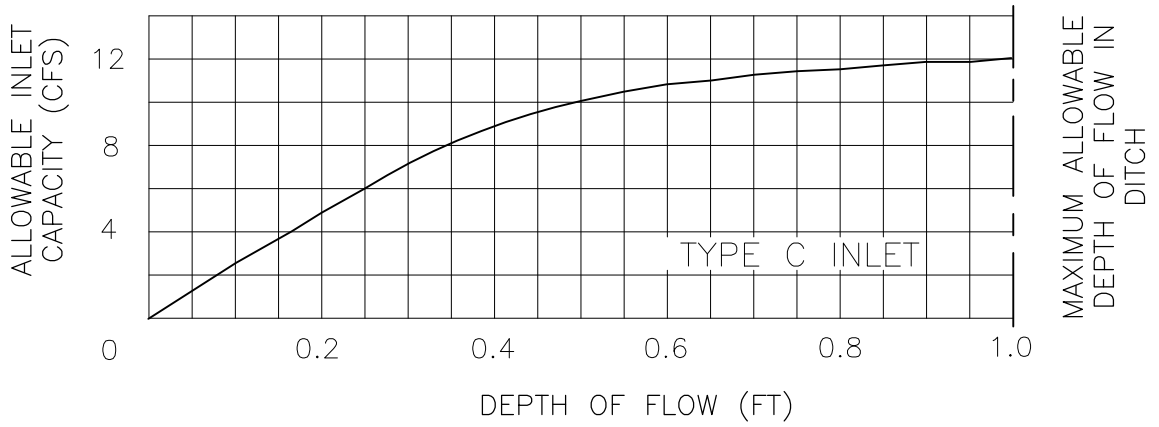
(B) NON-SYMMETRICAL STREET SECTION

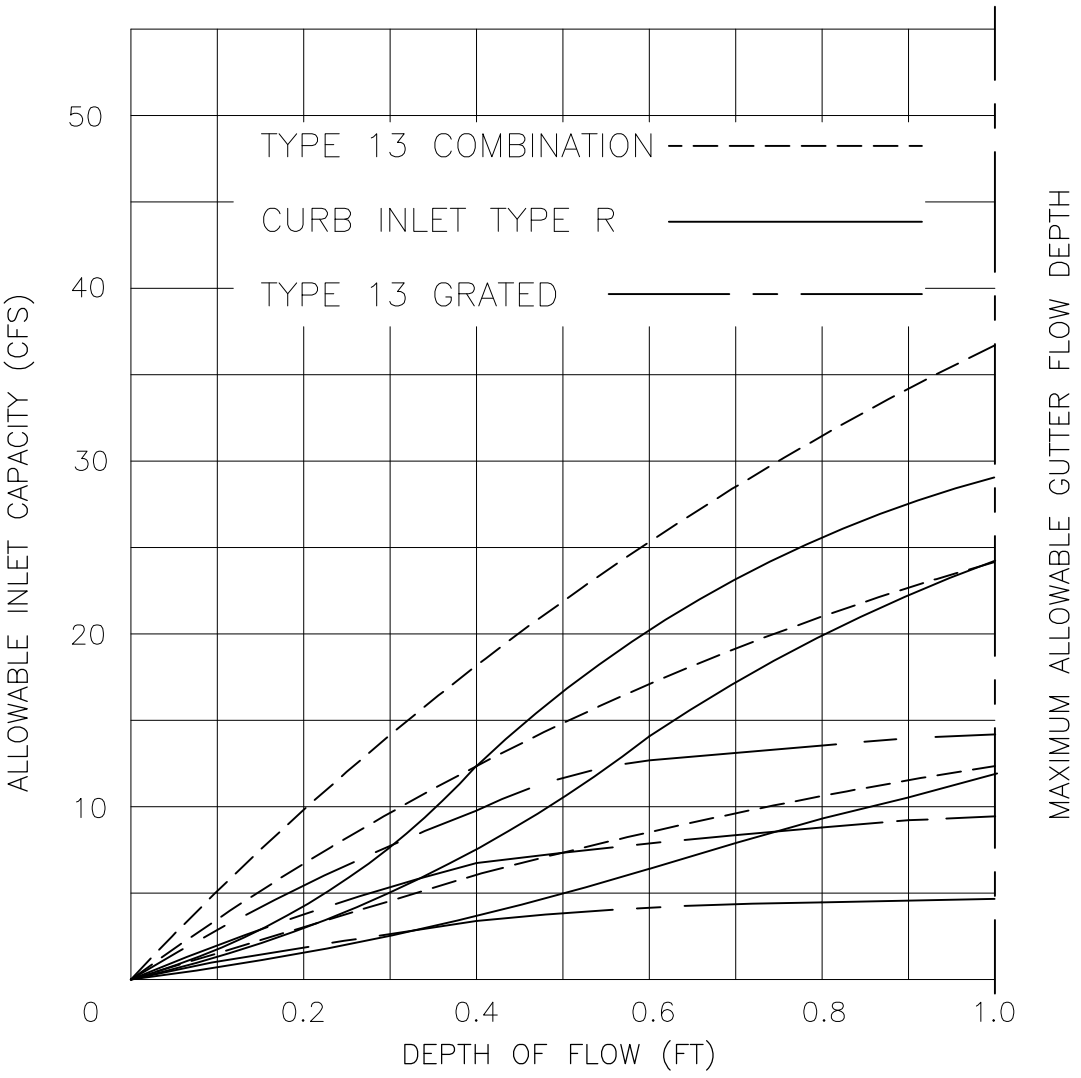
NOTE: FOR NON-SYMMETRICAL STREET SECTION, ADJUST THE TOTAL GUTTER CAPACITY BY REDUCING THE ALLOWABLE GUTTER CAPACITY FOR THE GUTTER WITH THE HIGHER FLOWLINE.

N.T.S.

	STANDARDS & SPECIFICATIONS	REVISED:	**GUTTER CAPACITY ADJUSTMENT**
DATE:	DRAWING NO. 400-15		

SUMP CONDITIONS–ALL INLETS





N.T.S.

	STANDARDS & SPECIFICATIONS	REVISED:	ALLOWABLE INLET CAPACITY
DATE:		DRAWING NO. 400–16	

DATE:

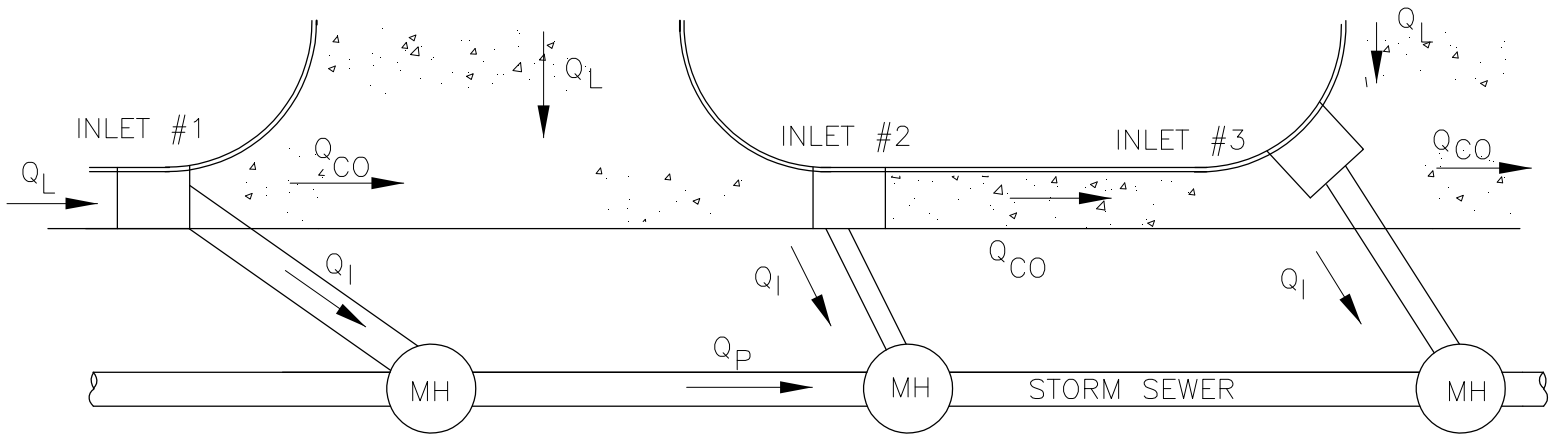
STANDARDS & SPECIFICATIONS

DRAWING NO. 400-17

REVISED:

INLET DESIGN EXAMPLES FOR MINOR STORM

N.T.S.



LEGEND:

Q_L = LOCAL RUNOFF FOR DESIGN STORM TRIBUTARY TO DESIGNATE INLET (CFS)
Q_I = RUNOFF INTERCEPTED BY INLET (CFS)
Q_{CO} = CARRY OVER RUNOFF PAST INLET (CFS)
Q_T = TOTAL RUNOFF AT INLET = $Q_L + Q_{CO}$
Q_P = RUNOFF IN PIPE

SUMMARY OF FLOWS FOR DESIGN EXAMPLE #4

INLET	Q* ALLOW	Q_L	Q_{CO}	Q_T	Q_I	Q_{CO}	Q SEWER	COMMENTS
NO. 1; 15' TYPE R	8.6	8	0	8	6.4	1.6	6.4	INLET ON GRADE
NO. 2; 10' TYPE R	7.2	4	1.6	5.6	3.7	1.9	10.1	INLET ON GRADE
NO. 3; 10' TYPE R	10.4	8	1.9	9.9	9.9	0	20.0	INLET IN SUMP CONDITION

* MAXIMUM ALLOWABLE INLET CAPACITY AT MAXIMUM ALLOWABLE GUTTER CAPACITY, FROM FIGURE 400-28

VERTICAL DIMENSION OF PIPE (INCHES)	MAXIMUM ALLOWABLE DISTANCE BETWEEN MANHOLES AND/OR CLEANOUTS
15 to 36	400 FEET
42 AND LARGER	500 FEET

MINIMUM RADIUS FOR RADIUS PIPE

DIAMETER OF PIPE	RADIUS OF CURVATURE
48" TO 54"	28.50 FEET
57" TO 72"	32.00 FEET
78" TO 108"	38.00 FEET

SHORT RADIUS BENDS SHALL NOT BE USED ON SEWERS 42 INCHES OR LESS IN DIAMETER

MINIMUM PIPE DIAMETER

TYPE	MINIMUM EQUIVALENT PIPE DIAMETER	MINIMUM CROSS-SECTIONAL AREA
MAIN TRUNK	18 INCHES	1.77 SQ FT
*LATERAL FROM INLET		

*MINIMUM SIZE OF LATERAL SHALL ALSO BE BASED UPON A WATER SURFACE INSIDE THE INLET WITH A MINIMUM DISTANCE OF 1 FOOT BELOW THE GRATE OR THROAT

MANNING'S N-VALUE

SEWER TYPE	CAPACITY CALCULATION	VELOCITY CALCULATION
CONCRETE (NEWER PIPE)	.013	.011
CONCRETE (OLDER PIPE)	.015	.012
CONCRETE (PRELIMINARY SIZING)	.015	.012
PLASTIC	.011	.009

N.T.S.

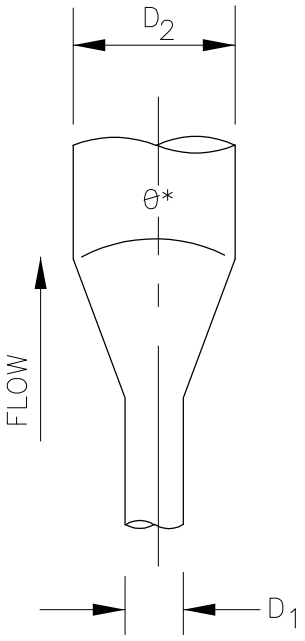
	STANDARDS & SPECIFICATIONS	REVISED:	STORM SEWER ALIGNMENT AND SIZE CRITERIA
DATE:	DRAWING NO. 400-18		

EXPANSION/CONTRACTION

(a) EXPANSION (K_e)

θ*	$\frac{D_2}{D_1}=3$	$\frac{D_2}{D_1}=1.5$
10	0.17	0.17
20	0.40	0.40
45	0.86	1.06
60	1.02	1.21
90	1.06	1.14
120	1.04	1.07
180	1.00	1.00

* THE ANGLE θ IS THE ANGLE IN DEGREES BETWEEN THE SIDES OF THE TAPERING SECTION



(b) PIPE ENTRANCE FROM RESERVOIR

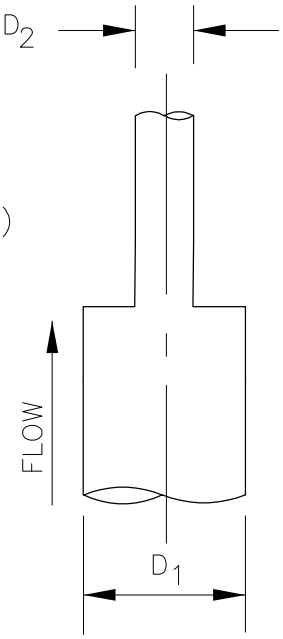
BELL-MOUTH $H_L = 0.04 \frac{V^2}{2g}$

SQUARE EDGE $H_L = 0.5 \frac{V^2}{2g}$

GROOVE END U/S FOR CONCRETE PIPE $H_L = 0.2 \frac{V^2}{2g}$

(c) CONTRACTION (K_c)

$\frac{D_2}{D_1}$	K_c
0	0.5
0.4	0.4
0.6	0.3
0.8	0.1
1.0	0



N.T.S.

	STANDARDS & SPECIFICATIONS	REVISED:	STORM SEWER ENERGY LOSS COEFFICIENT
DATE:	DRAWING NO. 400-19		

BENDS

$$H_L = K\ (V_j{}^2/2g)$$

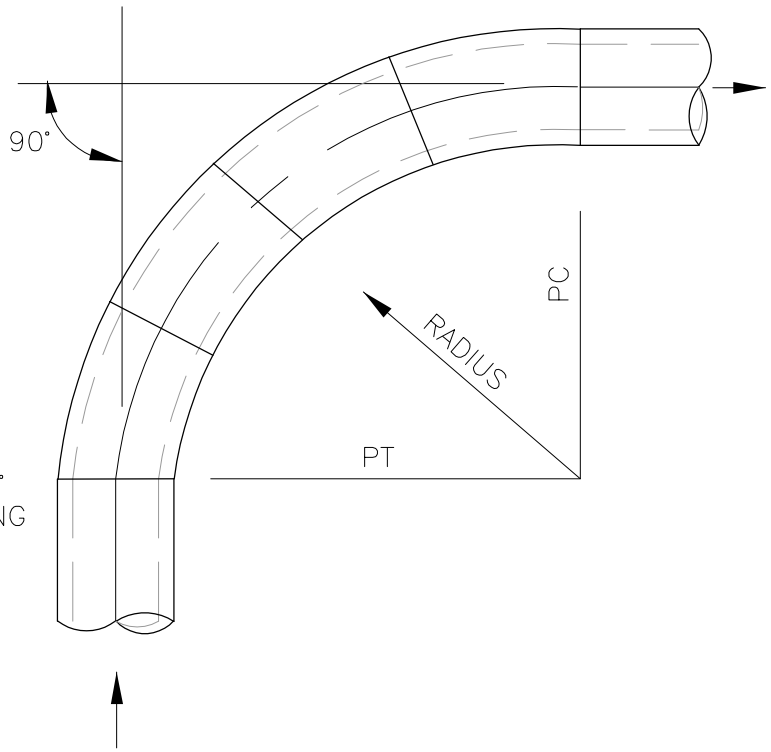
CASE I

CONDUIT ON 90° CURVES

NOTE: HEAD LOSS APPLIED AT PC FOR LENGTH

RADIUS	K_b
1 X D	0.50
(2 TO 8) X D	0.25
(8 TO 20) X D	0.04
>20 X D	0

*WHEN CURVES OTHER THAN 90° ARE USED, APPLY THE FOLLOWING FACTORS TO 90° CURVES
60° CURVE 85%
45° CURVE 70%
22-1/2° CURVE 40%

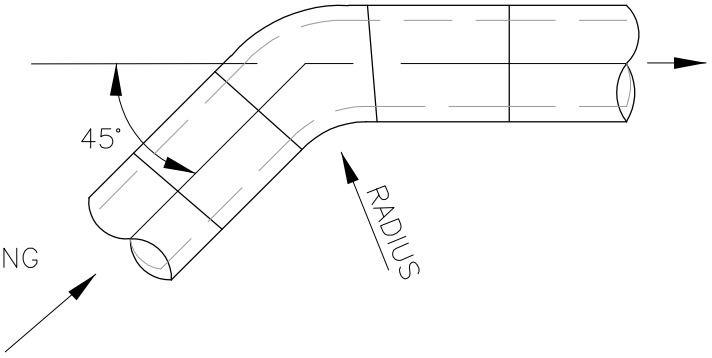


CASE II

BENDS WHERE RADIUS IS EQUAL TO DIAMETER OF PIPE

NOTE: HEAD LOSS APPLIED AT BEGINNING OF BEND

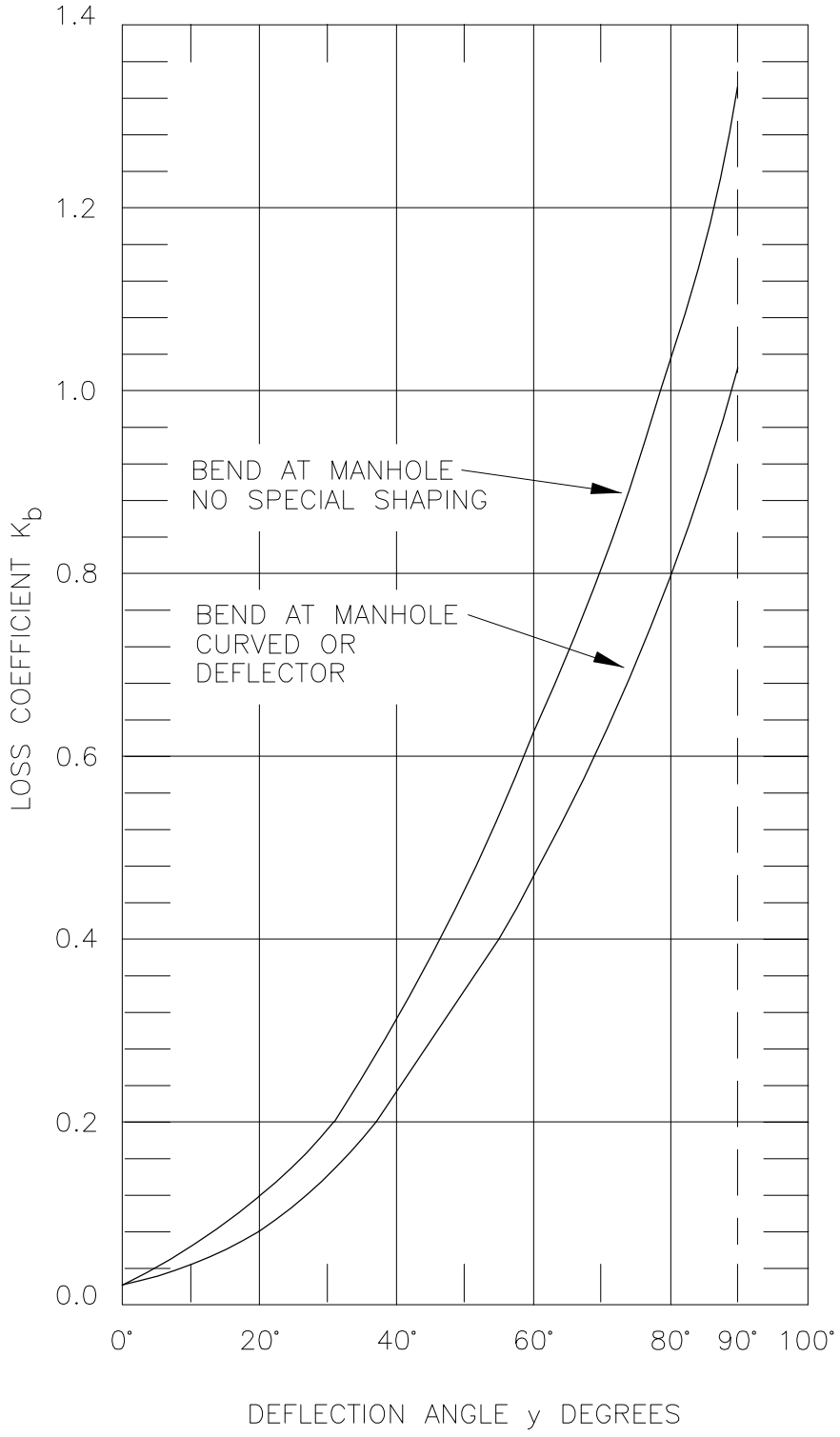
θ° BEND	K_b
90	0.50
60	0.43
45	0.35
22-1/2	0.20

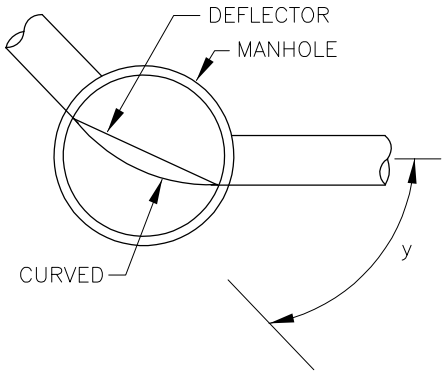


N.T.S.

	STANDARDS & SPECIFICATIONS	REVISED:	STORM SEWER ENERGY LOSS COEFFICIENT
DATE:	DRAWING NO. 400-20		

BENDS AT MANHOLES

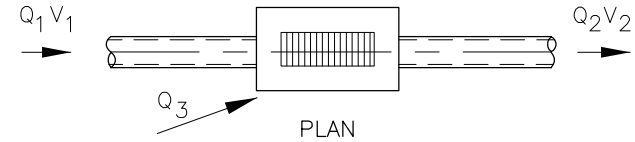




NOTE: HEAD LOSS APPLIED AT OUTLET OF MANHOLE

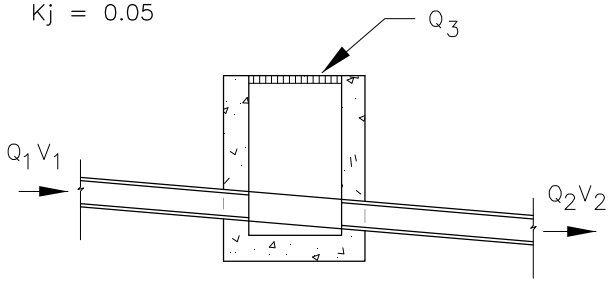
N.T.S.

	STANDARDS & SPECIFICATIONS	REVISED:	STORM SEWER ENERGY LOSS COEFFICIENT
DATE:		DRAWING NO. 400–21	



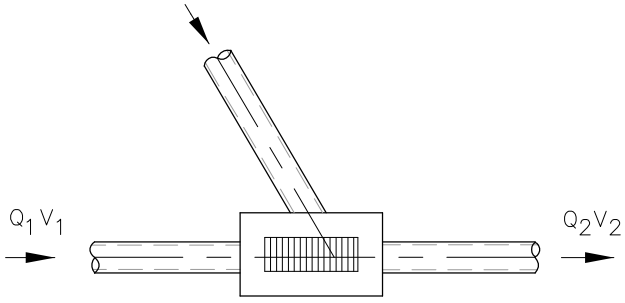
PLAN

USE EQUATION 400–4
Kj = 0.05



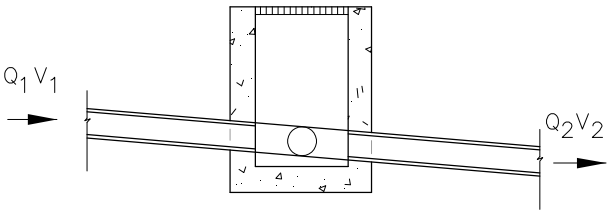
SECTION

CASE I
INLET OR STRAIGHT THROUGH
MANHOLE ON MAIN LINE



PLAN

USE EQUATION 400–8
Kj = 0.25

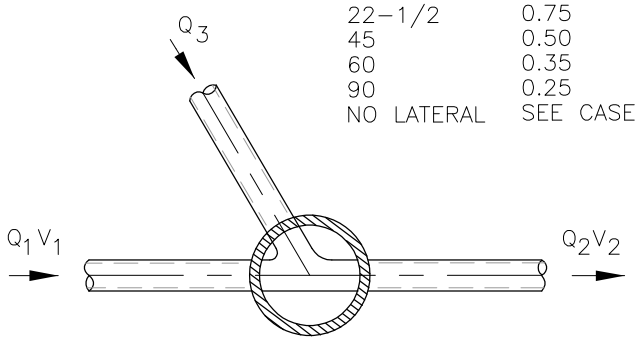


SECTION

CASE II
INLET ON MAIN LINE
WITH BRANCH LATERAL

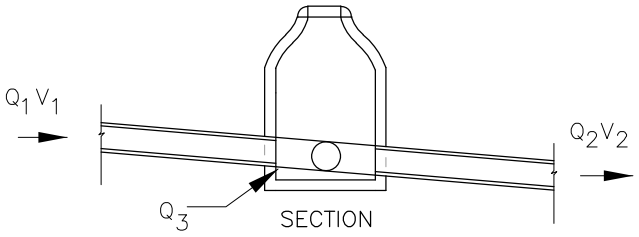
CASE III

Ø°	Kj
22–1/2	0.75
45	0.50
60	0.35
90	0.25
NO LATERAL	SEE CASE I



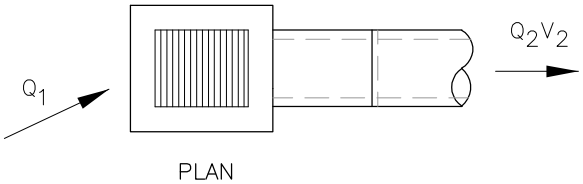
PLAN

USE EQUATION 400–8



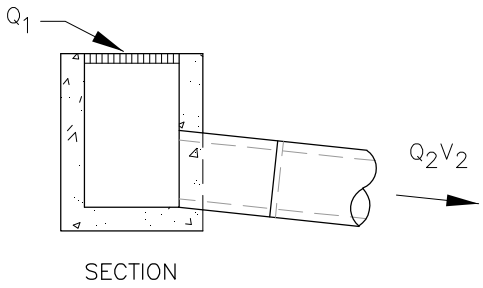
SECTION

CASE III
MANHOLE ON MAIN LINE
WITH Ø° BRANCH LATERAL



PLAN

USE EQUATION 400–4
Kj = 1.25

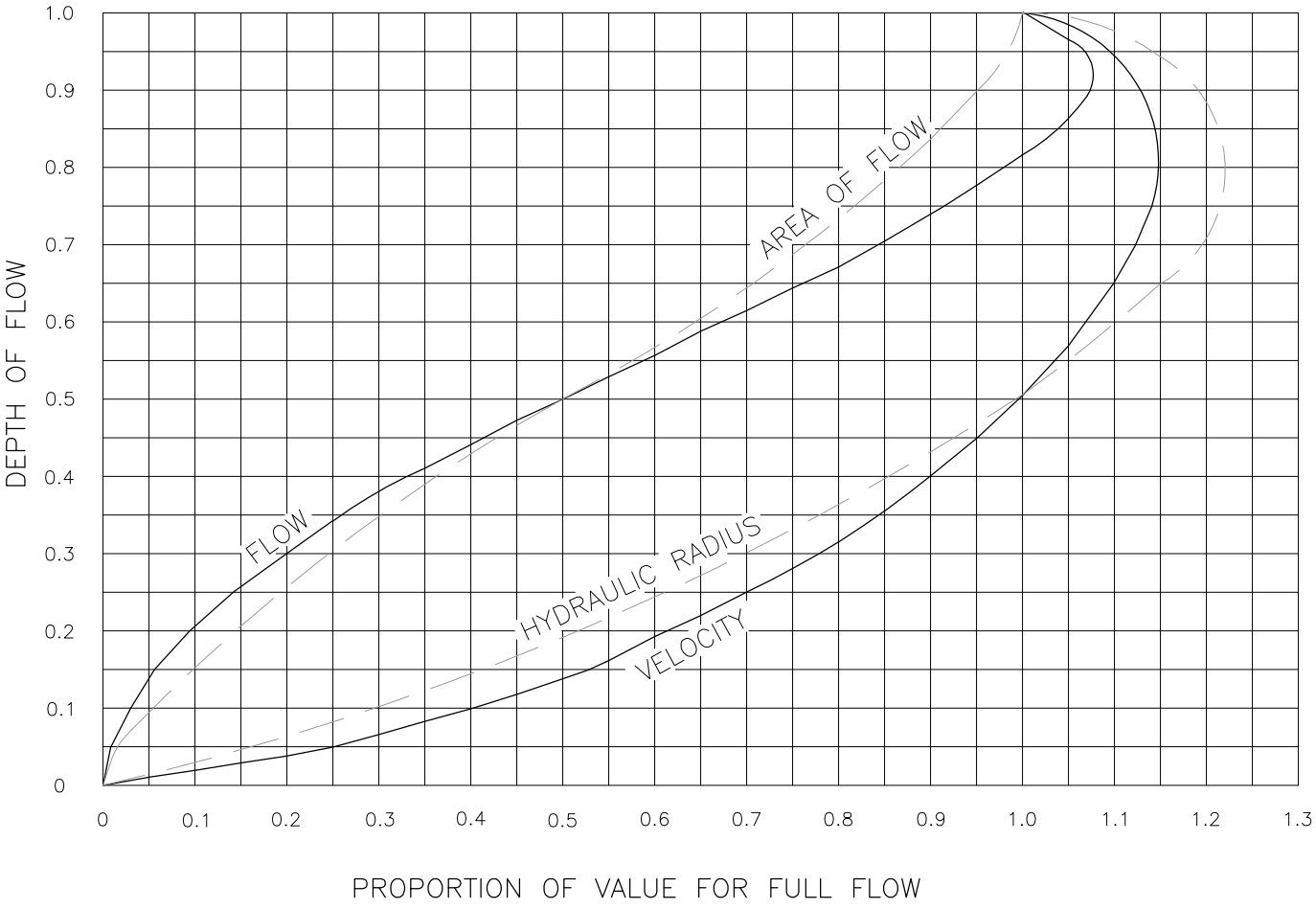


SECTION

CASE IV
INLET OR MANHOLE AT
BEGINNING OF LINE

N.T.S.

	STANDARDS & SPECIFICATIONS	REVISED:	MANHOLE JUNCTION LOSSES
DATE:		DRAWING NO. 400–22	

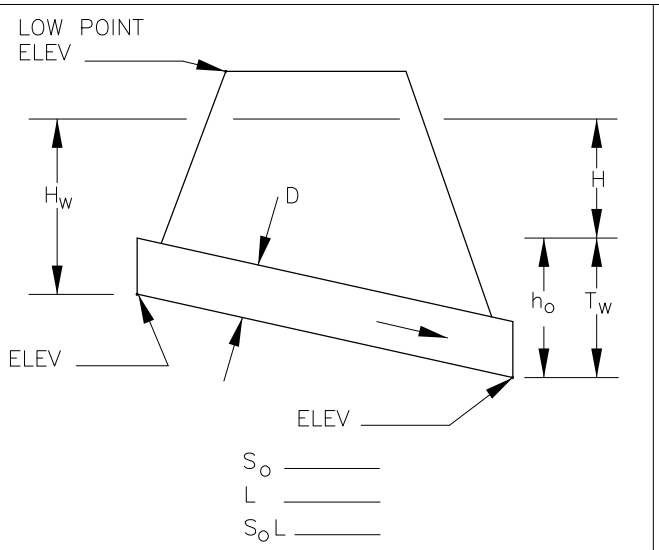


N.T.S.

	STANDARDS & SPECIFICATIONS	REVISED:	HYDRAULIC PROPERTIES CIRCULAR PIPE
DATE:		DRAWING NO. 400-23	

CULVERT RATING

PROJECT _____ LOCATION _____ STATION _____



CULVERT DATA

TYPE _____ n _____

INLET _____ Q_{FULL} _____

K_e _____ V_{FULL} _____

OUTLET CONTROL EQUATIONS

(1) $H_W = H + h_o - LS_o$

(2) FOR $T_w < D$; $h_o = \frac{d_c + D}{2}$ OR T_w (WHICHEVER IS GREATER)

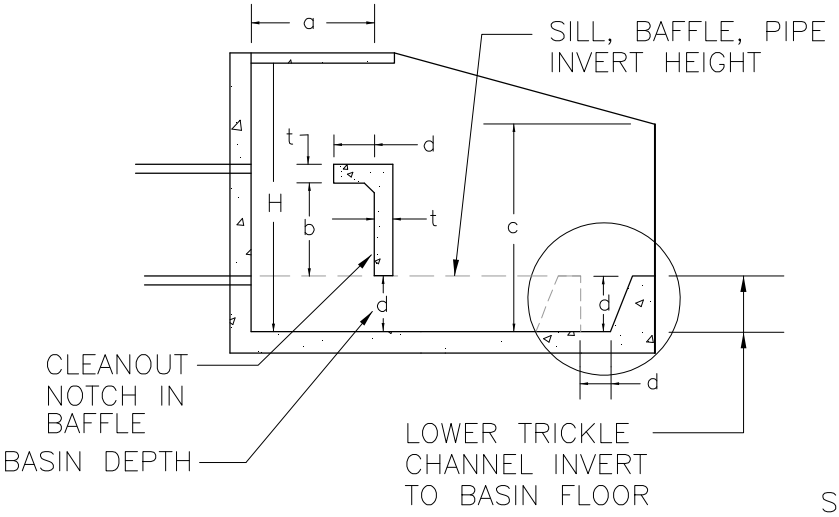
$T_w > D$; $h_o = T_w$

(3) FOR BOX CULVERT: $d_c = 0.315(Q/B)^{2/3} \leq D$

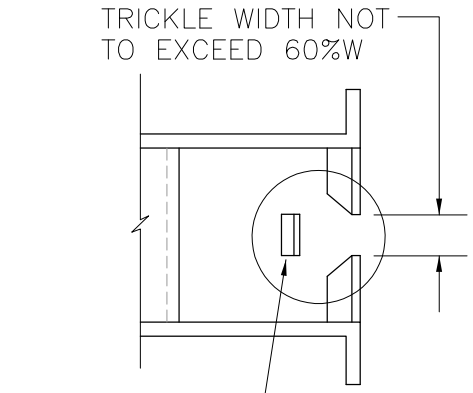
	INLET CONTROL		OUTLET CONTROL						CONT	CONTROL	ELEV
					$T_w < D$		$T_w > D$				
Q	$\frac{H_W}{D}$	H_W	H	T_w	d_c	$\frac{d_c+D}{2}=h_o$	h_o	H_W	H_W		
1	2	3	4	5	6	7	8	9	10	11	12

N.T.S.

	STANDARDS & SPECIFICATIONS	REVISED:	CULVERT RATING
DATE:		DRAWING NO. 400-24	

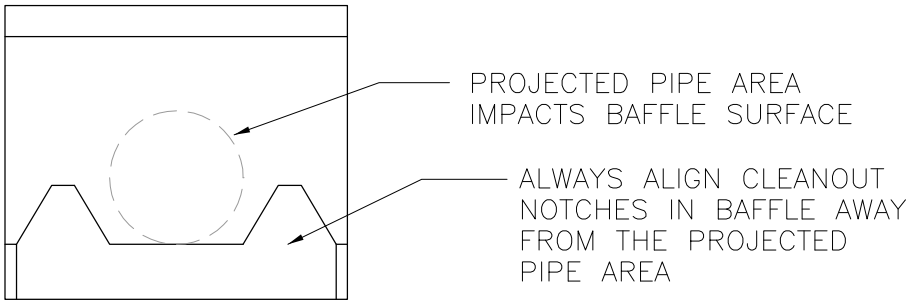


SECTION–BASIN FLOOR



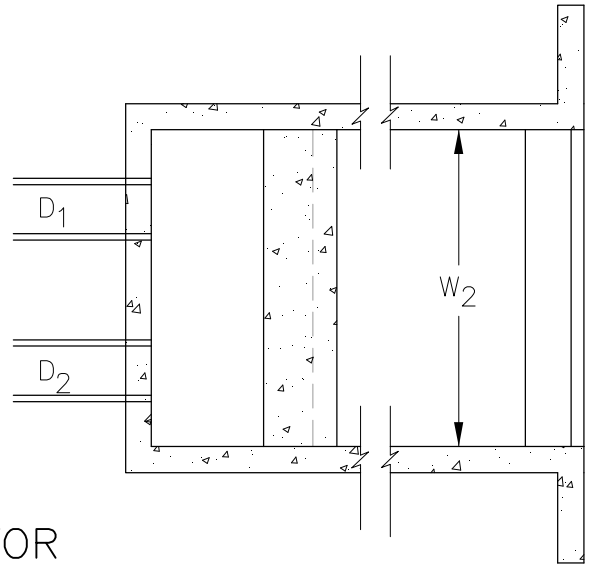
END SILL

H=3w/d
L=4/w/3
a=w/2
b=3w/8
c=w/2
d=w/6
t=w/12



END VIEW–BAFFLE NOTCHES

FOR TWO PIPES OF EQUAL SIZE AND SIMILAR FLOW RATE
$W_2 = 1.5\ W_1$
W_1 FROM DETAIL 400–52 BASED ON HIGHER FLOW OF D_1 OR D_2

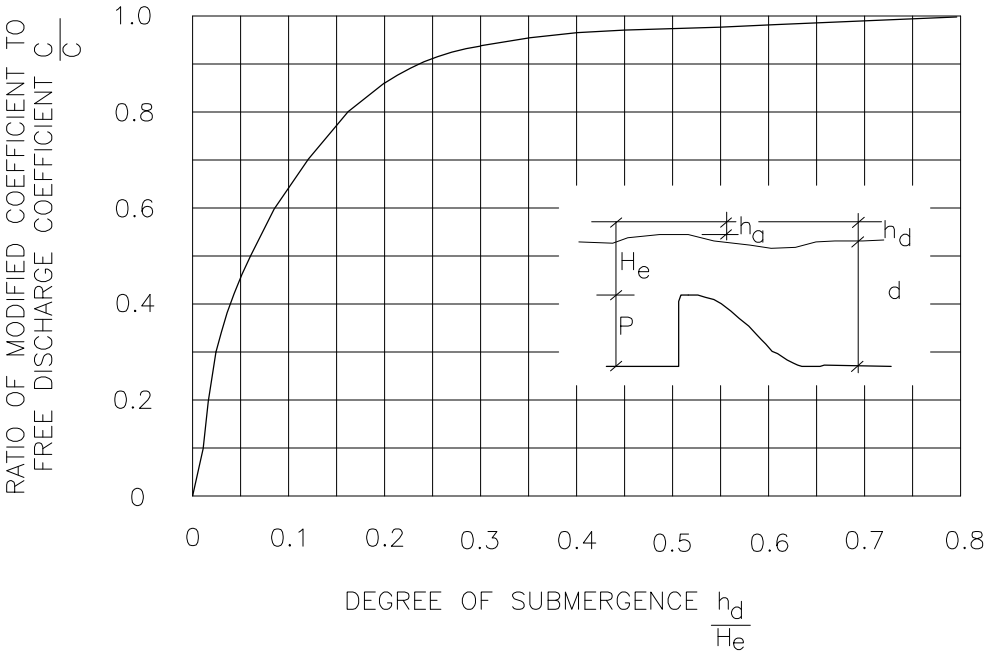


WIDTH ADJUSTMENT FOR DOUBLE PIPE OUTLET

N.T.S.

	STANDARDS & SPECIFICATIONS	REVISED:	IMPACT STILLING BASIN
DATE:	DRAWING NO. 400–25		

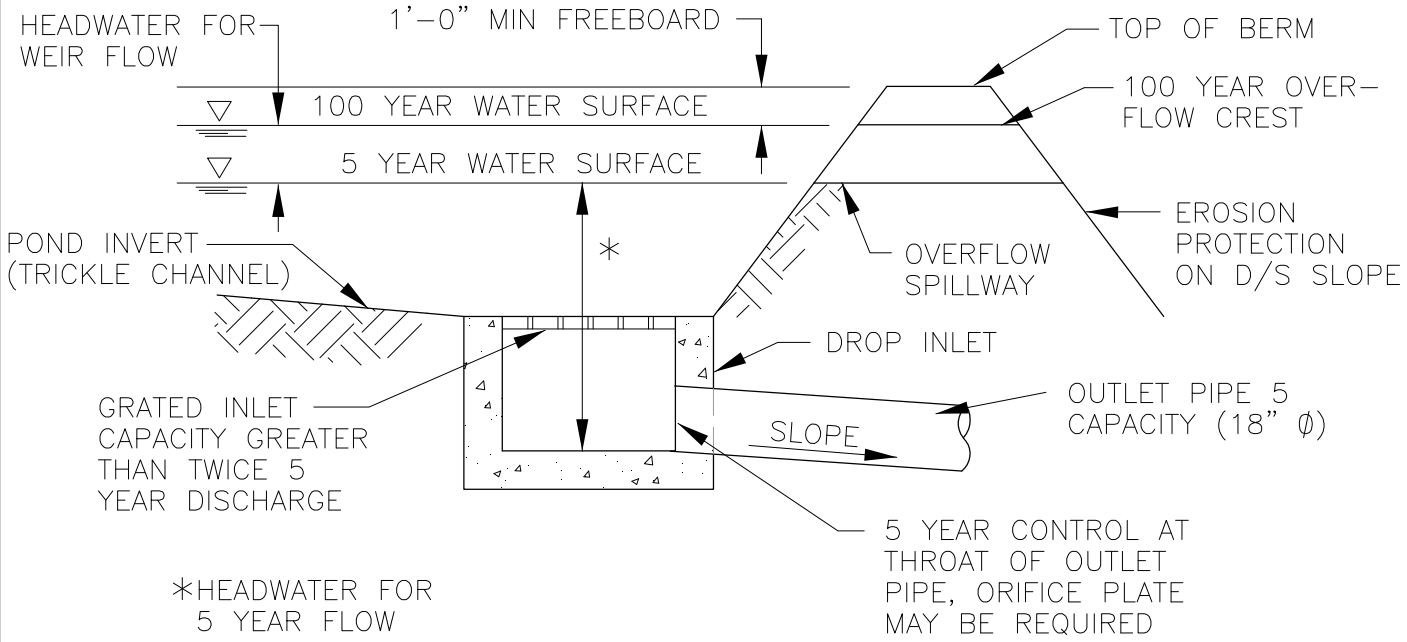
SHAPE	COEFFICIENT	COMMENTS	SCHEMATIC
SHARP CRESTED	–		
PROJECTION RATIO (H/P = 0.4)	3.4	H<1.0	
PROJECTION RATIO (H/P = 2.0)	4.0	H>1.0	
BROAD CRESTED	–		
W/SHARP U/S CORNER	2.6	MINIMUM VALUE	
W/ROUNDED U/S CORNER	3.1	CRITICAL DEPTH	
TRIANGULAR SECTION	–		
A) VERTICAL SLOPE	–		
1:1 D/S SLOPE	3.8	H>0.7	
4:1 D/S SLOPE	3.2	H>0.7	
10:1 D/S SLOPE	2.9	H>0.7	
B) 1:1 U/S SLOPE	–		
1:1 D/S SLOPE	3.8	H>0.5	
3:1 D/S SLOPE	3.5	H>0.5	
TRAPEZOIDAL SECTION			
1:1 U/S SLOPE, 2:1 D/S SLOPE	3.4	H>1.0	
2:1 U/S SLOPE, 2:1 D/S SLOPE	3.4	H>1.0	
ROAD CROSSINGS			
GRAVEL	3.0	H>1.0	
PAVED	3.1	H>1.0	



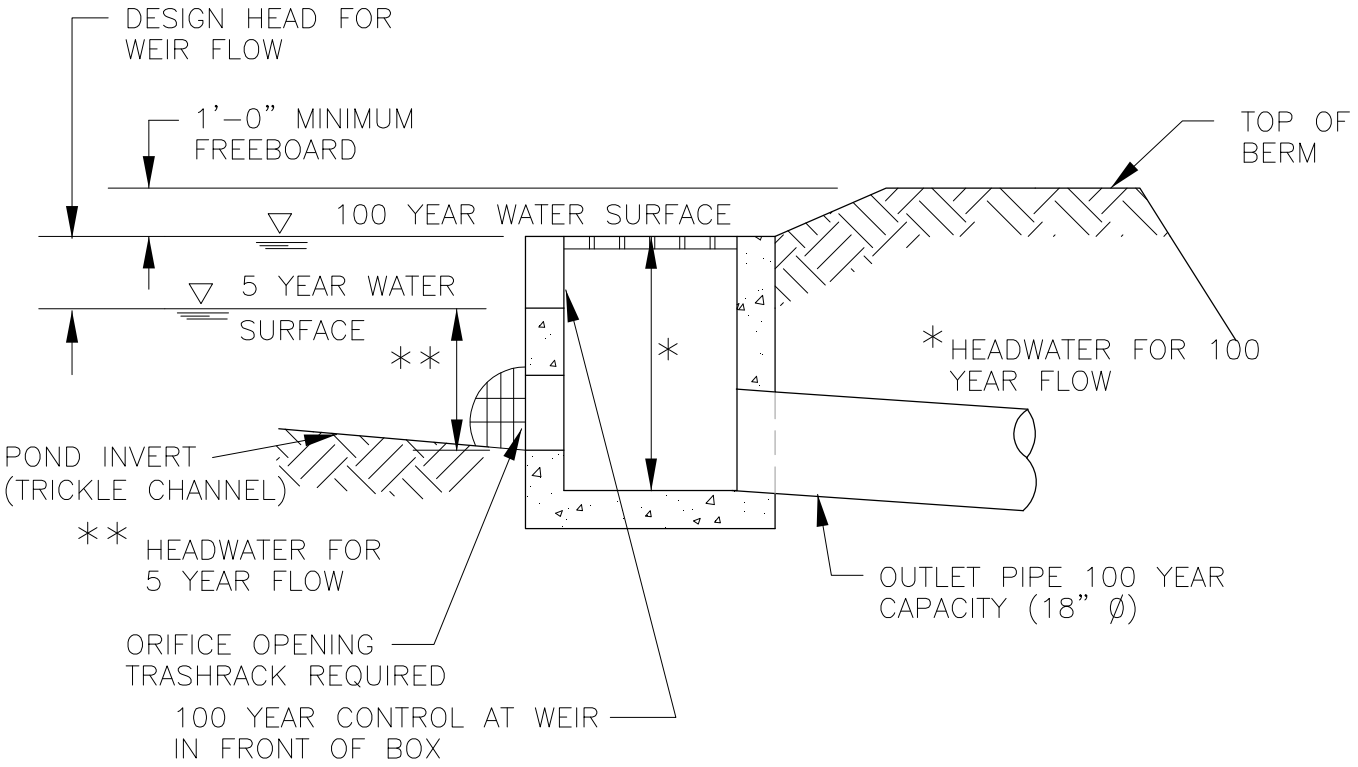
ADJUSTMENT FOR TAILWATER

N.T.S.

	STANDARDS & SPECIFICATIONS	REVISED:	WEIR FLOW COEFFICIENTS
DATE:		DRAWING NO. 400–26	



TYPE I OUTLET

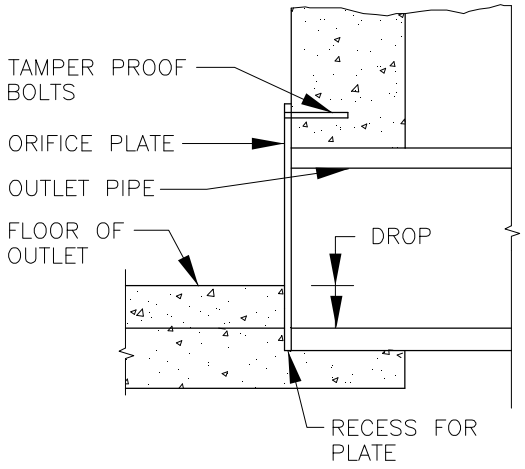


TYPE 2 OUTLET

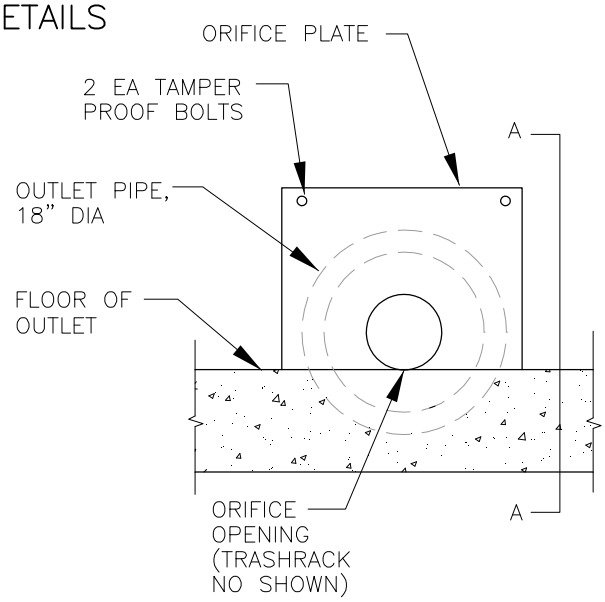
N.T.S.

	STANDARDS & SPECIFICATIONS	REVISED:	**DETENTION POND OUTLET CONFIGURATIONS**
DATE:		DRAWING NO. 400-27	

(A) ORIFICE PLATE DETAILS

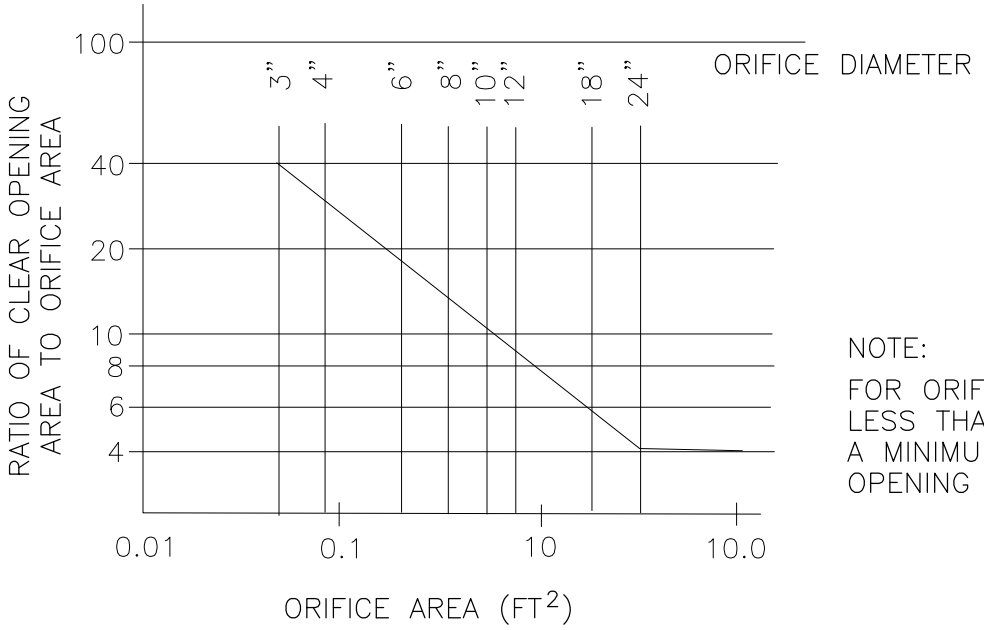


SECTION A–A



NOTE: TRASHRACK CAPACITY TO BE 10 TIMES ORIFICE CAPACITY

(B) TRASHRACK AREA REQUIREMENTS

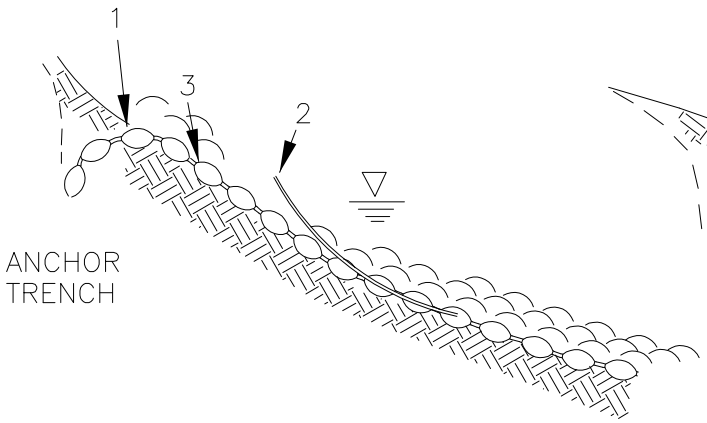


NOTE:

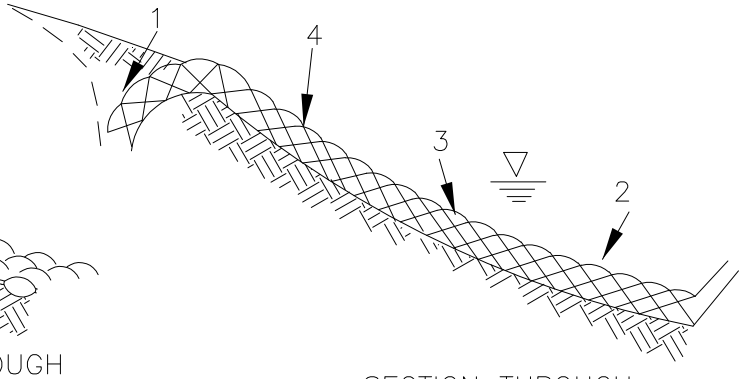
FOR ORIFICE DIAMETER LESS THAN 3", USE A MINIMUM CLEAR OPENING OF 2 FT^2

N.T.S.

	STANDARDS & SPECIFICATIONS	REVISED:	DETENTION POND DETAILS
DATE:		DRAWING NO. 400–28	

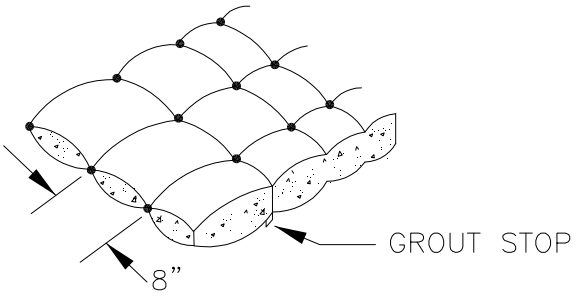


SECTION THROUGH
FILTER POINT MAT

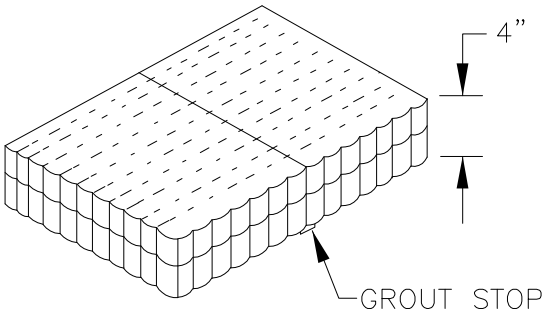


SECTION THROUGH
UNIFORM CROSS
SECTION MAT

8 INCH FILTER POINT



UNIFORM CROSS SECTION

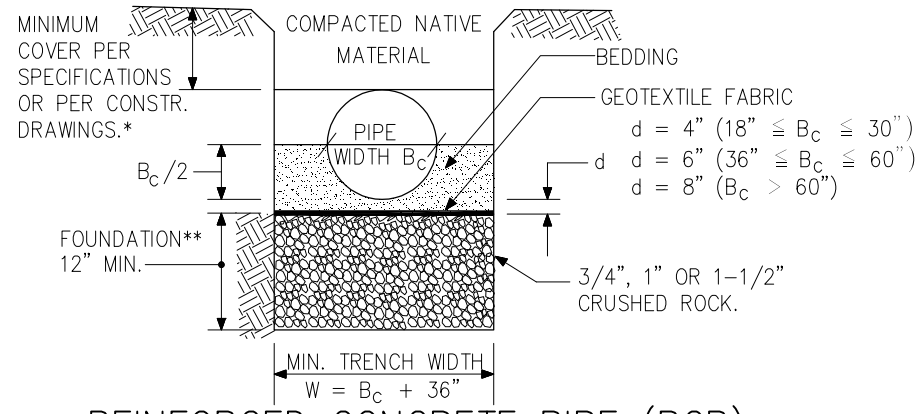


NOTE:

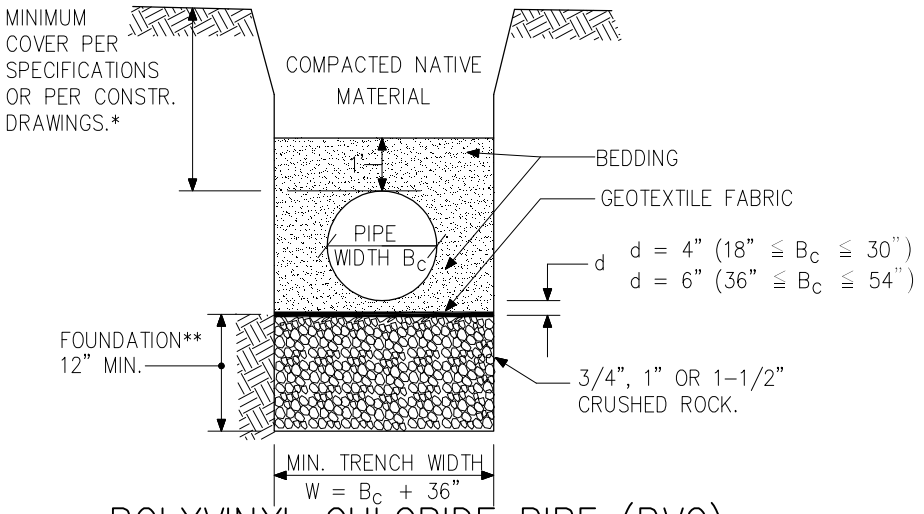
1. NUMBERS REFER TO SEQUENCE OF MORTAR INJECTION
2. LINERS MAY BE USED PROVIDED THE FROUDE NUMBER OF THE CHANNEL SECTION IS LESS THAN 0.8

N.T.S.

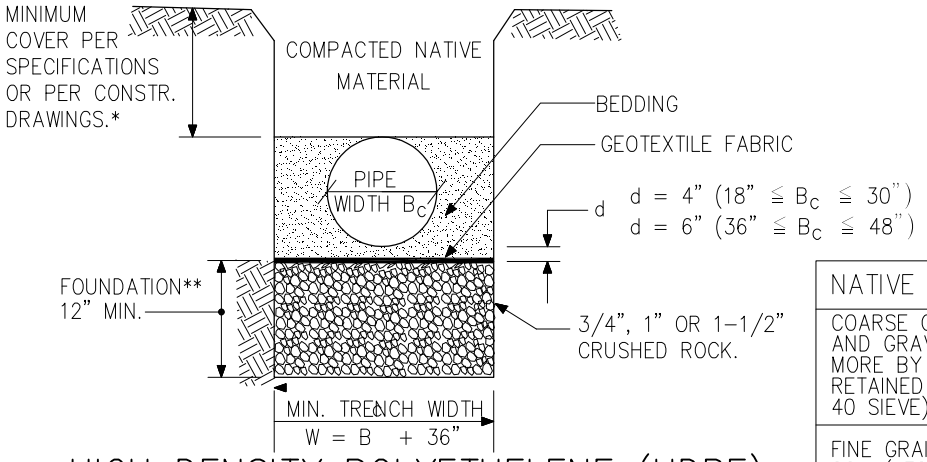
	STANDARDS & SPECIFICATIONS	REVISED:	EROSION CONTROL MATTRESSES
DATE:	DRAWING NO. 400–29		



REINFORCED CONCRETE PIPE (RCP)



POLYVINYL CHLORIDE PIPE (PVC)



HIGH DENSITY POLYETHELENE (HDPE)
CORRUGATED METAL PIPE (CMP)

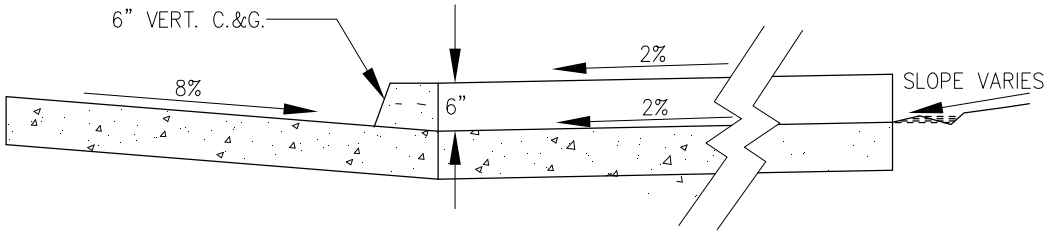
NATIVE SOIL:	BEDDING:
COARSE GRAINED SAND AND GRAVEL (50% OR MORE BY WEIGHT RETAINED ON # 40 SIEVE)	CDOT CLASS A FILTER MATERIAL (SECTION 703.0q)
FINE GRAINED SOIL (LESS THAN 50% RETAINED ON # 40 SIEVE)	UDFCD TYPE 1 FILTER MATERIAL, CDOT FINE AGGREGATE FOR CONCRETE AASHTO M6 (SECTION 703.01)

* MINIMUM COVER SHALL NOT INCLUDE PAVEMENT.

** MAY BE REQUIRED IN AREAS WITH HIGH GROUNDWATER TABLE OR UNSUITABLE SUB-GRADE.

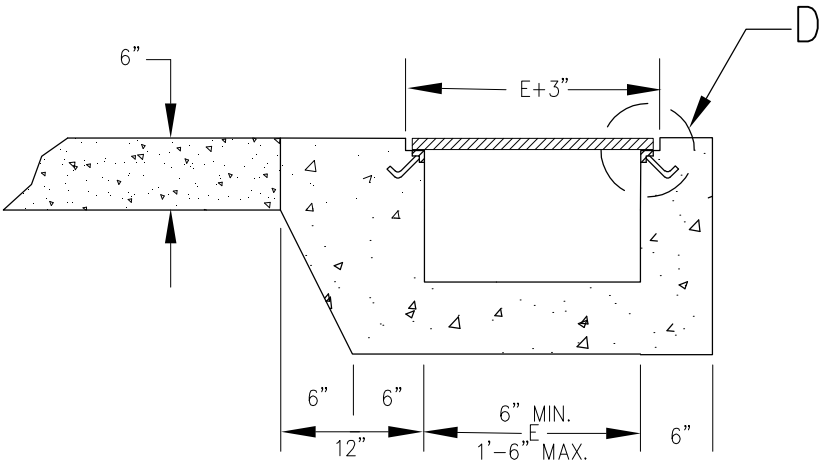
N.T.S.

	STANDARDS & SPECIFICATIONS	REVISED:
DATE:	DRAWING NO. 400-30	STORM DRAINAGE PIPE BEDDING DETAILS

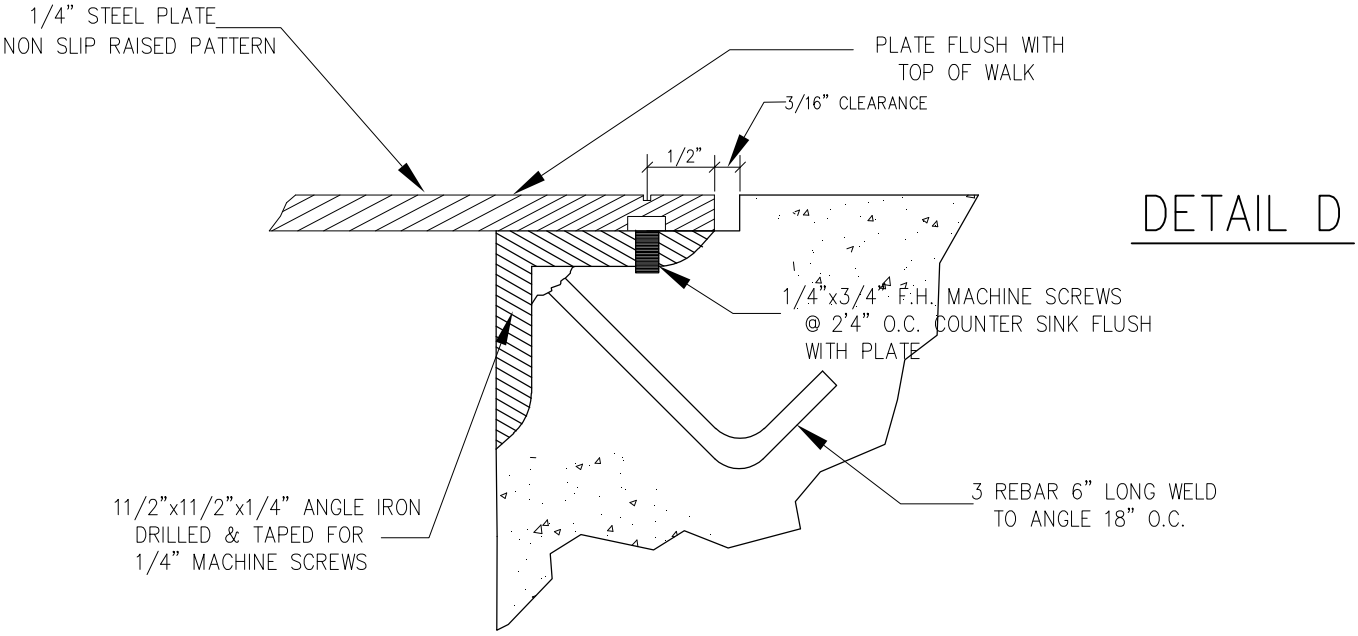


SECTION B–B

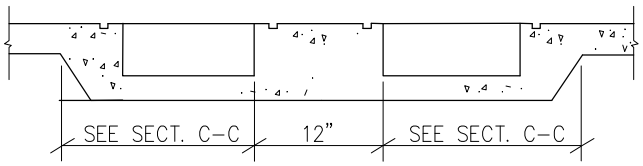
SECTION C–C



DETAIL D

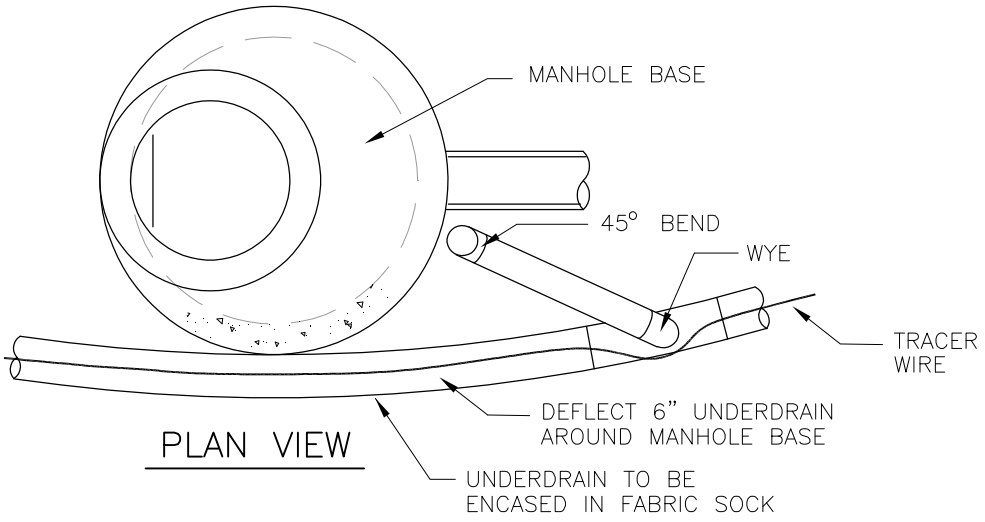


MULTIPLE CHASE

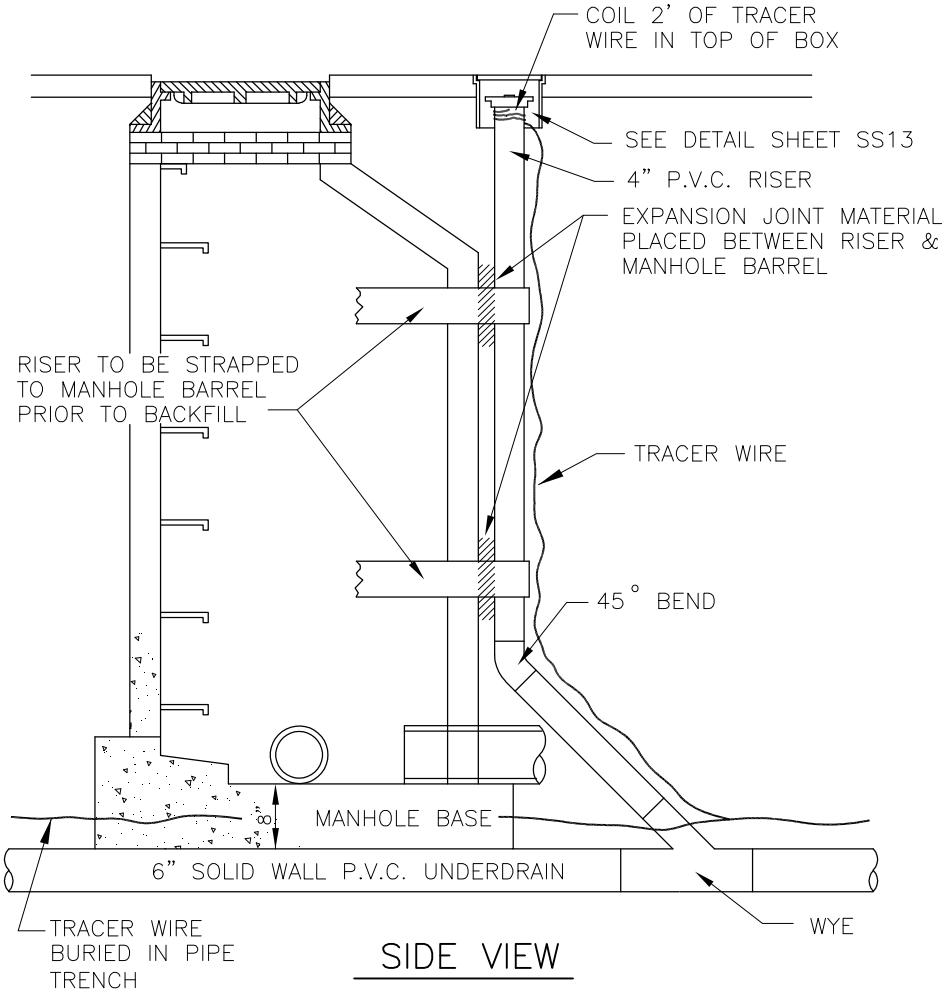


N.T.S.

	STANDARDS & SPECIFICATIONS	REVISED:	CHASE DRAIN DETAILS
DATE:	DRAWING NO. 400–31		



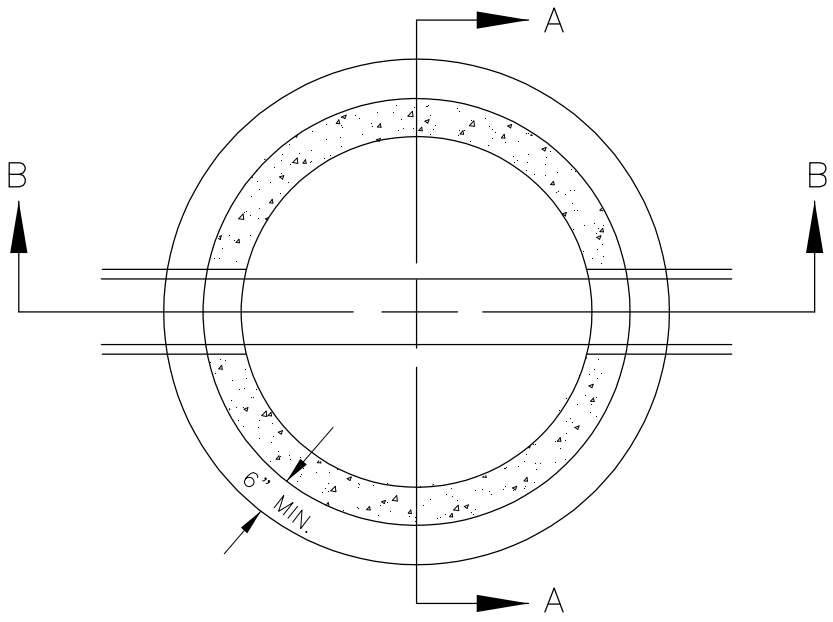
PLAN VIEW



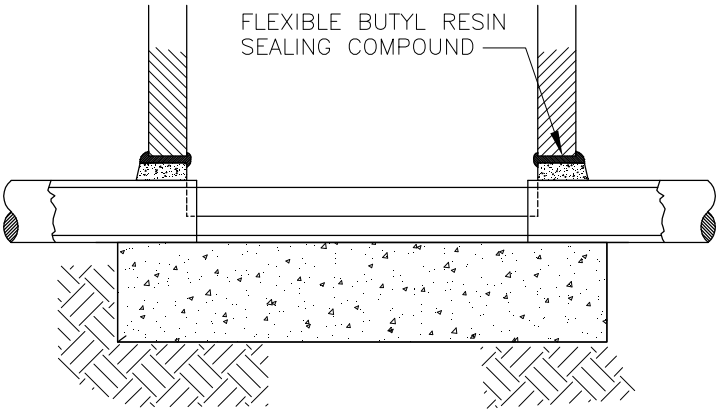
SIDE VIEW

N.T.S.

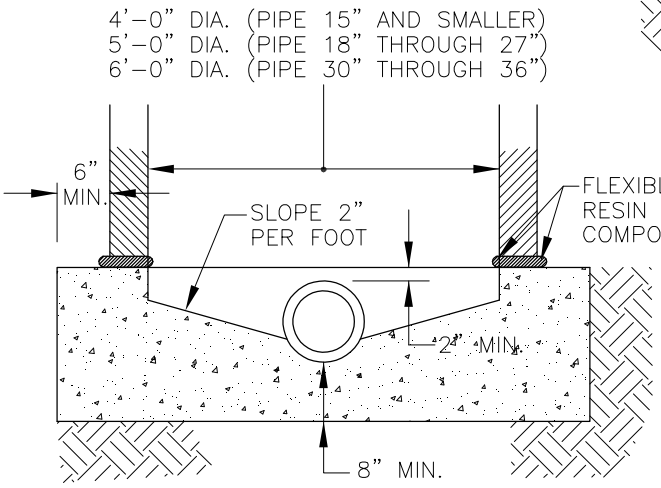
	STANDARDS & SPECIFICATIONS	REVISED:	UNDERDRAIN CLEANOUT DETAIL
DATE:		DRAWING NO. 400-32	



PLAN



SECTION B–B



SECTION A–A

NOTES:

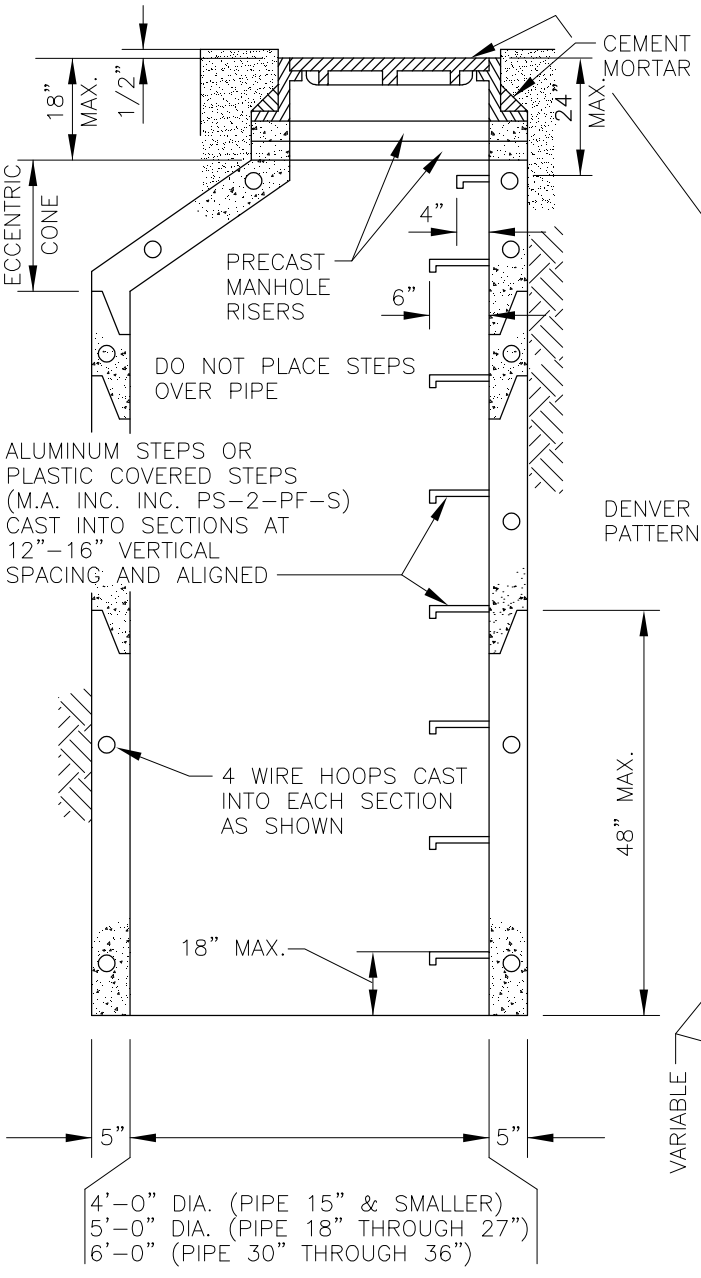
1. JOINTS TO BE SET IN FLEXIBLE BUTYL RESIN SEALING COMPOUND AND GROUTED WITH MORTAR INSIDE AND OUTSIDE.
2. BASES SHALL BE REINFORCED WHEN THE DISTANCE FROM INVERT TO TOP OF COVER WILL EXCEED 15 FT. REINFORCING TO BE APPROVED BY CITY ENGINEER.
3. SQUARE BASES ARE ACCEPTABLE.
4. FOR PIPE 36" AND LARGER, OR WHERE CONDITIONS SUCH AS MULTIPLE PIPES WARRANT, A CONCRETE BOX BASE WILL BE REQUIRED. (SEE CDOT STANDARD DRAWING M–604–20)

N.T.S.

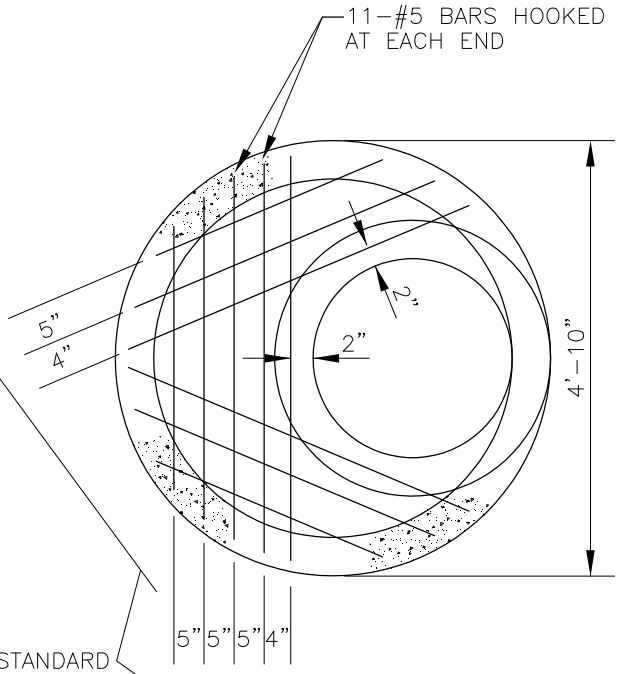
	STANDARDS & SPECIFICATIONS	REVISED:	STANDARD MANHOLE BASE
DATE:		DRAWING NO. 400–33	

NOTES:

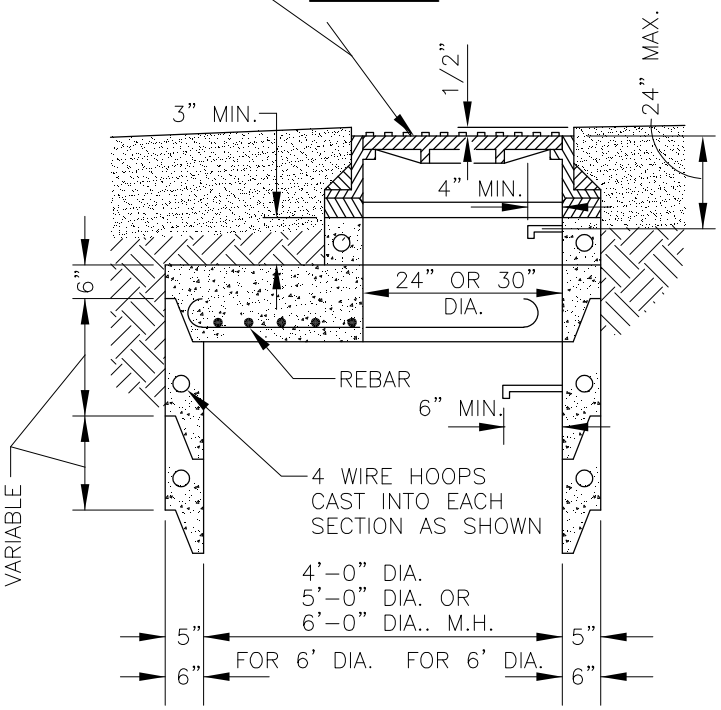
1. ALL JOINTS TO BE SET IN FLEXIBLE BUTYL RESIN SEALING COMPOUND AND PLASTERED WITH MORTAR 5/8" THICK AND EXTENDING 4" EACH SIDE OF JOINT INSIDE AND OUTSIDE.
2. MORTAR ON RISER RINGS IS ACCEPTABLE.
3. MANHOLES INSTALLED OUTSIDE OF STREET RIGHT-OF-WAY SHALL HAVE LOCKING COVERS.
4. "SEWER" TO BE IMPRINTED ON COVER.
5. FOR PIPE 36" AND LARGER, OR WHERE CONDITIONS SUCH AS MULTIPLE PIPES WARRANT, A CONCRETE BOX BASE WILL BE REQUIRED. (SEE CDOT STANDARD DRAWING M-604-20)



TYPICAL MANHOLE SECTION WITH ECCENTRIC CONE



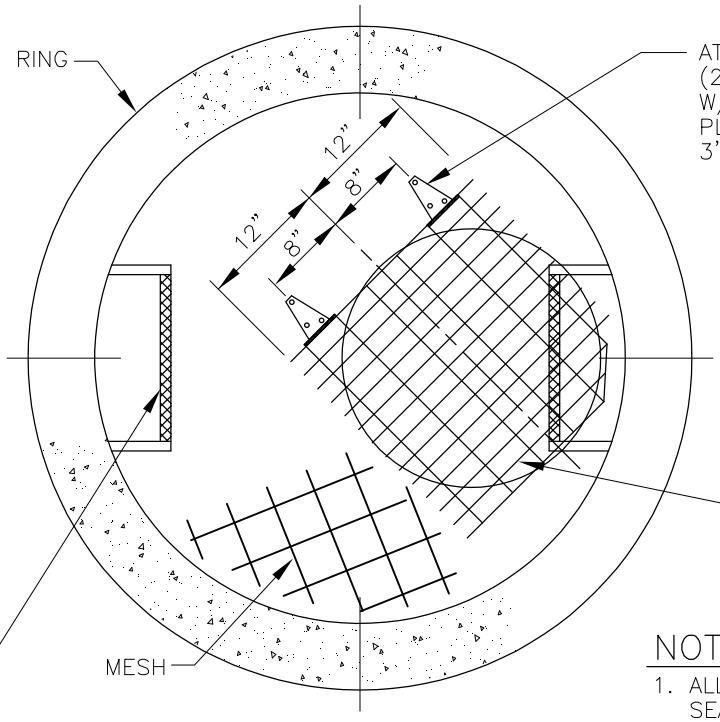
PLAN



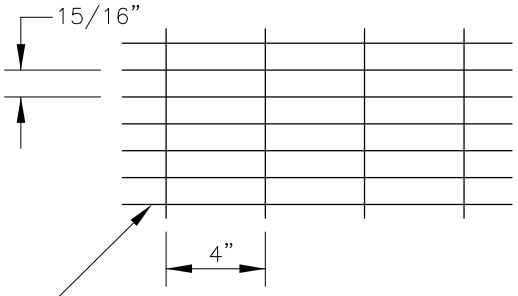
ALTERNATE FLAT TOP

N.T.S.

	STANDARDS & SPECIFICATIONS	REVISED:	MANHOLE BARRELS AND ALTERNATE TOPS
DATE:		DRAWING NO. 400-34	



ATTACH HINGE TO GRATING WITH (2) 3/8" DIA. BOLTS x 1" O.C. W/HEX NUTS. ATTACH HINGE TO PLATFORM WITH (2) 3/8 DIA. x 3" LG. RED HEADS OR EQUAL.

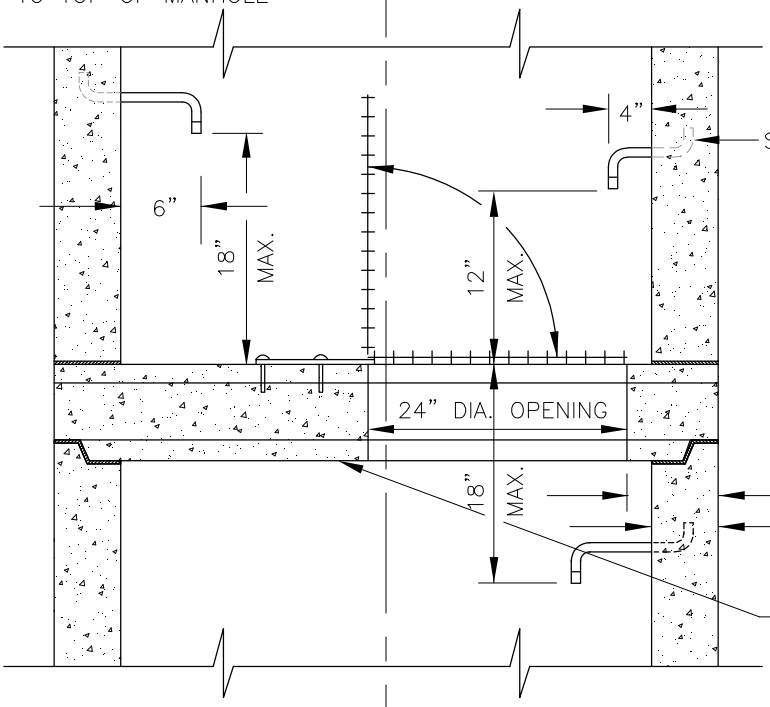


ALUMINUM GRATING, 3/16" x 1 1/4" BEARING BARS.

ALIGN STEPS ABOVE & OPPOSITE PLATFORM OPENING AS SHOWN TO TOP OF MANHOLE

NOTE:

1. ALL JOINTS TO BE SET IN FLEXIBLE BUTYL RESIN SEALING COMPOUND AND PLASTERED WITH MORTAR 5/8" THICK AND EXTENDING 4" EACH SIDE OF JOINT INSIDE AND OUTSIDE.



SAFETY HANDHOLD TO PLATFORM

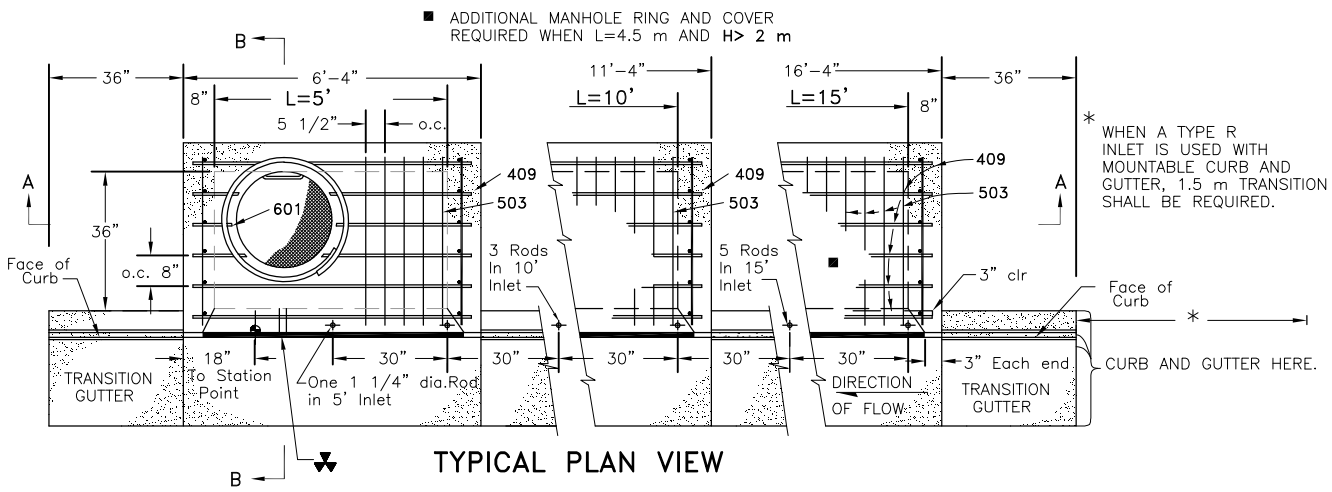
STANDARD PRECAST FLAT TOP WITH 4X4, 4/4 MESH

TO BE USED WHEN THE DISTANCE FROM INVERT TO TOP OF COVER EXCEEDS 17 FT.

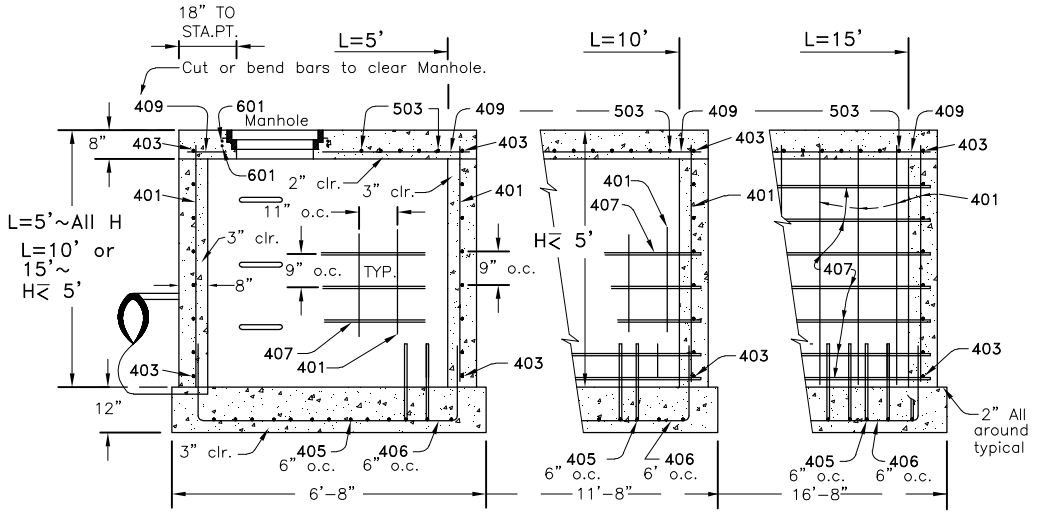
FOR MANHOLES OVER 17' IN DEPTH

N.T.S.

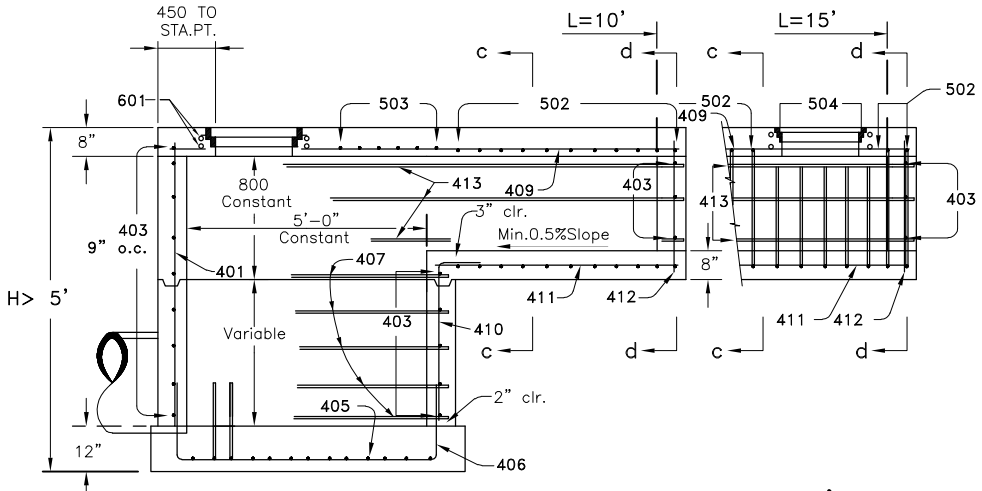
	STANDARDS & SPECIFICATIONS	REVISED:
DATE:	DRAWING NO. 400-35	**INTERMEDIATE PLATFORM**



TYPICAL PLAN VIEW



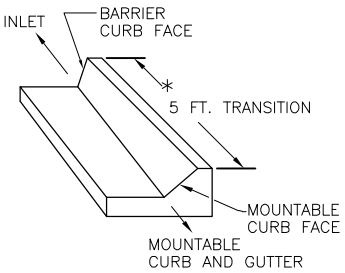
SECTION A–A REGULAR INLET



SECTION A–A INLET WITH DROP BOX ~ H> 5'

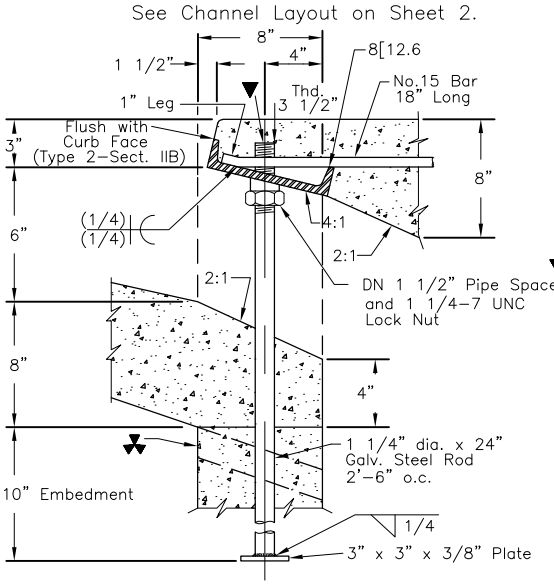
N.T.S.

	STANDARDS & SPECIFICATIONS	REVISED:	CURB INLET TYPE R SHEET 1 0F 4
DATE:		DRAWING NO. 400–36	



TRANSITION CURB

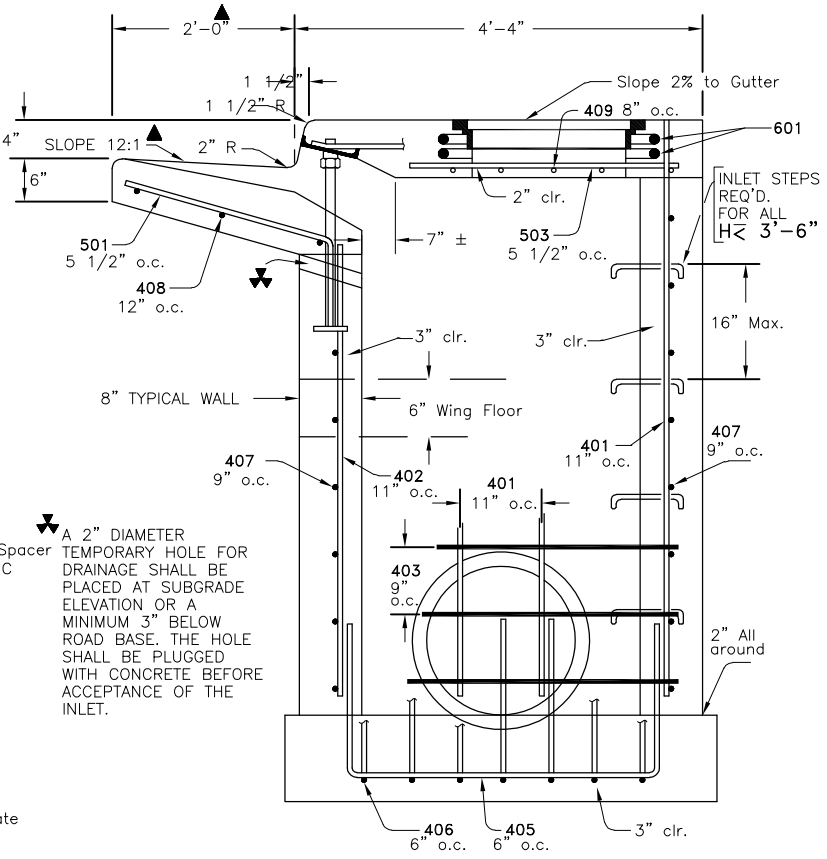
MEET SHAPE OF NORMAL BARRIER



▼CURB FACE ASSEMBLY,

PLACE ENTIRE ASSEMBLY BEFORE POURING CONCRETE

▲– FOR A 1'–0" PAN SLOPE 6:1

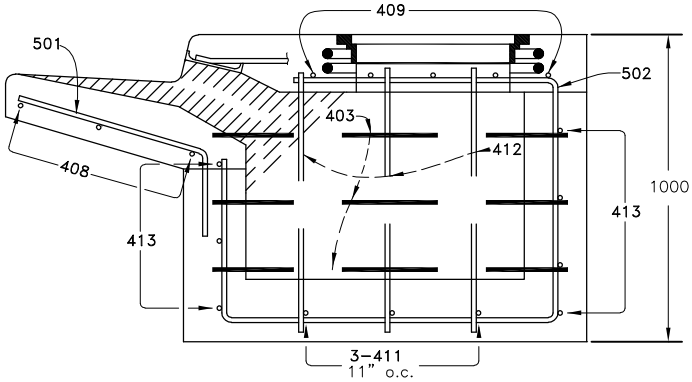


▼A 2" DIAMETER TEMPORARY HOLE FOR DRAINAGE SHALL BE PLACED AT SUBGRADE ELEVATION OR A MINIMUM 3" BELOW ROAD BASE. THE HOLE SHALL BE PLUGGED WITH CONCRETE BEFORE ACCEPTANCE OF THE INLET.

SECTION B–B

TYPICAL END VIEW

NOTE: MANHOLE RING & COVER, STATION POINT AND OUTFLOW PIPE SHALL BE LOCATED AT THE SAME END OF THE INLET.



(DOTTED BARS ARE IN SECTION d–d)

SECTIONS c–c & d–d

N.T.S.

	STANDARDS & SPECIFICATIONS	REVISED:
DATE:	DRAWING NO. 400–37	CURB INLET TYPE R SHEET 2 OF 4

TABLE ONE ~ BAR LIST FOR CURB INLETS, TYPE "R"

MARK	DIA (in)	O.C. SPACING (in)	TYPE	ALL INLETS L= → 5'		INLETS, H ≤ 5'				INLETS, H ≥ 5'			
						10'		15'		10'		15'	
				NO. REQ'D.	LENGTH (ft-in)	NO. REQ'D.	LENGTH (ft-in)	NO. REQ'D.	LENGTH (ft-in)	NO. REQ'D.	LENGTH (ft-in)	NO. REQ'D.	LENGTH (ft-in)
401		11"	II	15	*	21	*	26	*	11	*	11	*
402		11"	II	7	*	13	*	18	*	7	*	7	*
403		9"	II	*	4'-0"	*	4'-0"	*	4'-0"	*	4'-0"	*	4'-0"
405		6"	VI	11	6'-10"	21	6'-10"	31	6'-10"	11	6'-10"	11	6'-10"
406		6"	VIII	7	8'-10"	7	13'-10"	7	18'-10"	7	8'-10"	7	8'-10"
407	1/2"	9"	II	*	5'-10"	*	10'-10"	*	15'-10"	*	5'-10"	*	5'-10"
408		12"	II	3	6'-0"	3	11'-0"	3	16'-0"	3	11'-0"	3	16'-0"
409		8"	II	6	5'-10"	6	10'-10"	6	15'-10"	6	10'-10"	6	15'-10"
410		11"	VI							3	*	3	*
411		11"	II							3	5'-2"	3	10'-2"
412		11"	II							3	2'-9"	3	2'-9"
413		9"	II							7	10'-10"	7	15'-10"
501		5 1/2"	IX	11	3'-4"	22	3'-4"	33	3'-4"	22	3'-4"	33	3'-4"
502	5/8"	5 1/2"	III							11	11'-5"	17	11'-5"
503		5 1/2"	II	5	3'-6"	16	3'-6"	27	3'-6"	6	3'-6"	6	3'-6"
504		5 1/2"	IX									5	8'-4"
601	3/4"	2 1/2"	V	2	8'-10"	2	8'-10"	2	8'-10"	2	8'-10"	4	8'-10"
Ø8[8.5				1	5'-10"	1	10'-10"	1	15'-10"	1	10'-10"	1	15'-10"
▼				2 BARS, 1 ROD	——	4 BARS, 3 RODS	——	8 BARS, 5 RODS	——	4 BARS, 3 RODS	——	8 BARS, 5 RODS	——

* VARIABLE, REFER TO TABLE TWO.

Ø INCLUDE 18" NO. 4 BARS (SEE CHANNEL LAYOUT DETAIL).

▼ SEE CURB FACE ASSEMBLY ON SHEET 2 AND AND CHANNEL LAYOUT DETAILS ON SHEET 4.

REGULAR INLETS

DROP BOX INLETS

TABLE TWO ~ BARS AND QUANTITIES VARIABLE WITH "H"

"H" (ft-in)	LENGTH (ft-in)			NO. REQ'D. REGULAR		NO. REQ'D. DROP BOX		L= 5'		L= 10'		L= 15'	
	401	402	410	403	407	403	407	CONC. CU.YD.	STEEL LBS.	CONC. CU.YD.	STEEL LBS.	CONC. CU.YD.	STEEL LBS.
3'-0"	2'-8"	1'-8"		10	7			3.2	285	5.3	497	7.4	706
3'-6"	3'-2"	2'-2"		10	7			3.4	305	5.7	528	7.9	747
4'-0"	3'-8"	2'-8"		12	9			3.7	326	6.0	559	8.4	786
4'-6"	4'-2"	3'-2"		12	9			3.9	334	6.4	571	8.8	803
5'-0"	4'-8"	3'-8"		14	11			4.1	354	6.7	602	9.3	844
5'-6"	5'-2"	4'-2"	3'-5"	16	13	15	6	4.4	375	6.0	607	7.4	850
6'-0"	5'-8"	4'-8"	3'-11"	16	13	16	6	4.6	382	6.2	616	7.6	860
6'-6"	6'-2"	5'-2"	4'-5"	18	15	18	8	4.8	402	6.4	637	7.8	880
7'-0"	6'-8"	5'-8"	4'-11"	20	17	19	10	5.0	423	6.6	654	8.0	897
7'-6"	7'-2"	6'-2"	5'-5"	20	17	20	10	5.3	430	6.9	664	8.3	907
8'-0"	7'-8"	6'-8"	5'-11"	22	19	22	12	5.5	451	7.1	684	8.5	927
8'-6"	8'-2"	7'-2"	6'-5"	24	21	23	14	5.7	471	7.3	702	8.7	944
9'-0"	8'-8"	7'-8"	6'-11"	24	21	24	14	6.0	479	7.6	711	9.0	954
9'-6"	9'-2"	8'-2"	7'-5"	26	23	26	16	6.2	499	7.8	732	9.2	974
10'-0"	9'-8"	8'-8"	7'-11"	28	25	27	18	6.4	520	8.0	749	9.4	992
10'-6"	10'-2"	9'-2"	8'-5"	28	25	28	18	6.7	527	8.3	759	9.7	1001
11'-0"	10'-8"	9'-8"	8'-11"	30	27	30	20	6.9	547	8.5	779	9.9	1022

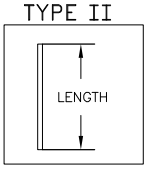
NOTE: FOR L= 5', L= 10' AND L= 15'

REGULAR INLETS: TOTAL QUANTITIES NEEDED ARE OUTSIDE OF THE HEAVY BLACK LINE.

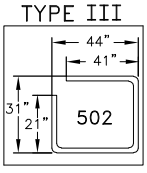
DROP BOX INLETS: TOTAL QUANTITIES NEEDED ARE INSIDE OF THE HEAVY BLACK LINE.

STEEL WEIGHTS DO NOT INCLUDE STRUCTURAL STEEL.

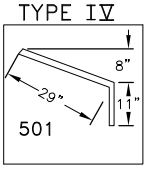
TYPE II



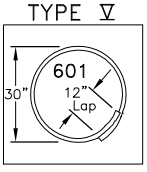
TYPE III



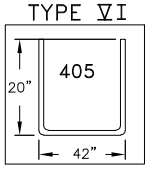
TYPE IX



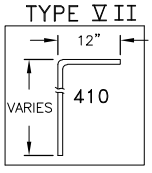
TYPE V



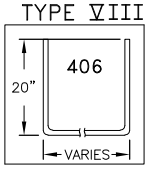
TYPE VI



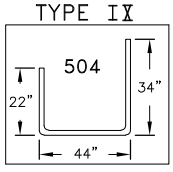
TYPE VII



TYPE VIII



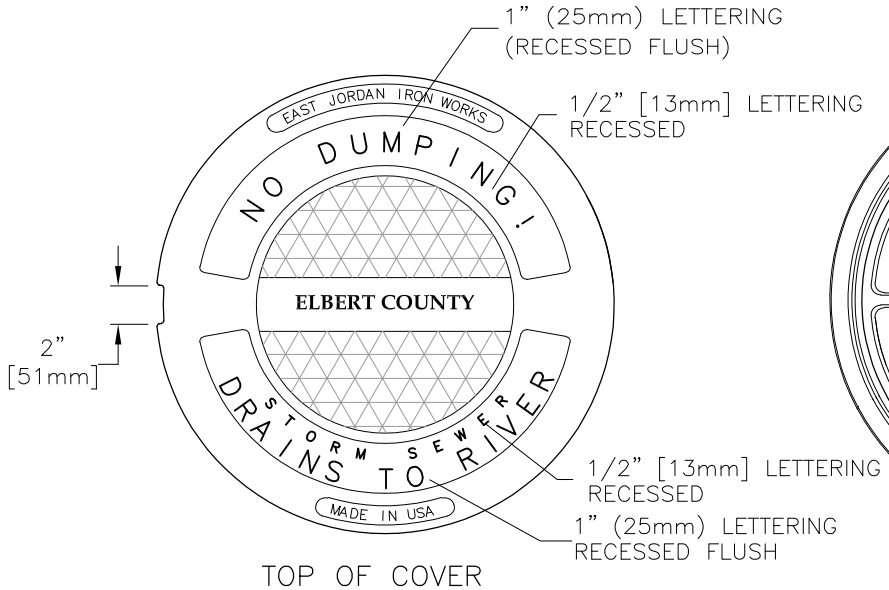
TYPE IX



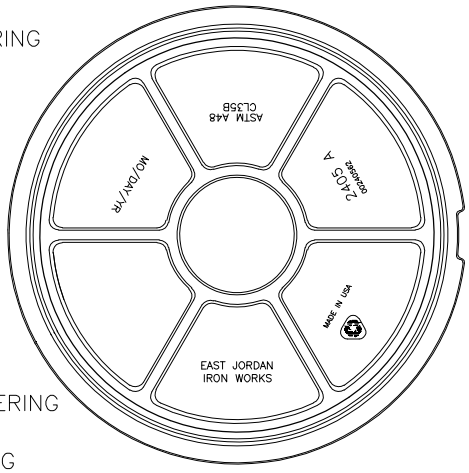
BAR BENDING DIAGRAMS ~ (Dimensions are Out-to-Out of bar)

N.T.S.

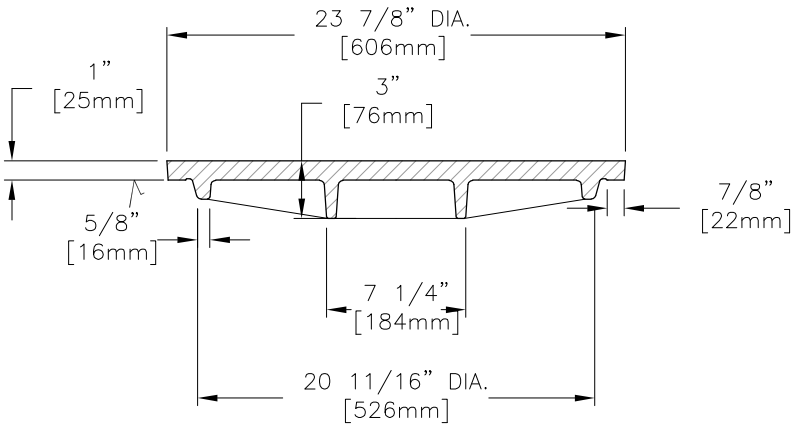
	STANDARDS & SPECIFICATIONS	REVISED:	CURB INLET TYPE R SHEET 3 OF 4
DATE:		DRAWING NO. 400-38	



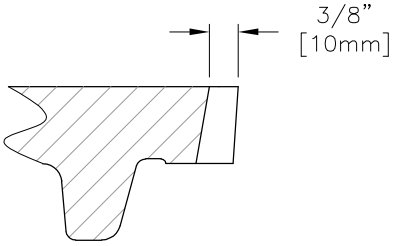
TOP OF COVER



BOTTOM OF COVER



SECTION OF COVER



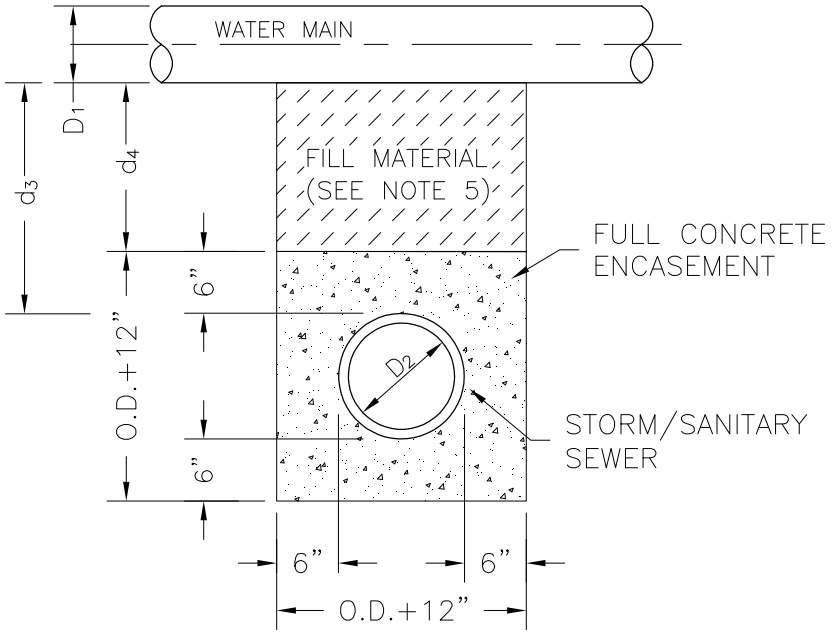
PICKSLOT DETAIL

COVER: GRAY IRON ASTM A48 CL35 B
LOAD RATING: H-20
COVER: 135 LBS 61kg
PRODUCT NUMBER 00240562
√ MACHINED SURFACE

EAST JORDAN IRON WORKS #2405A
PRODUCT #240562

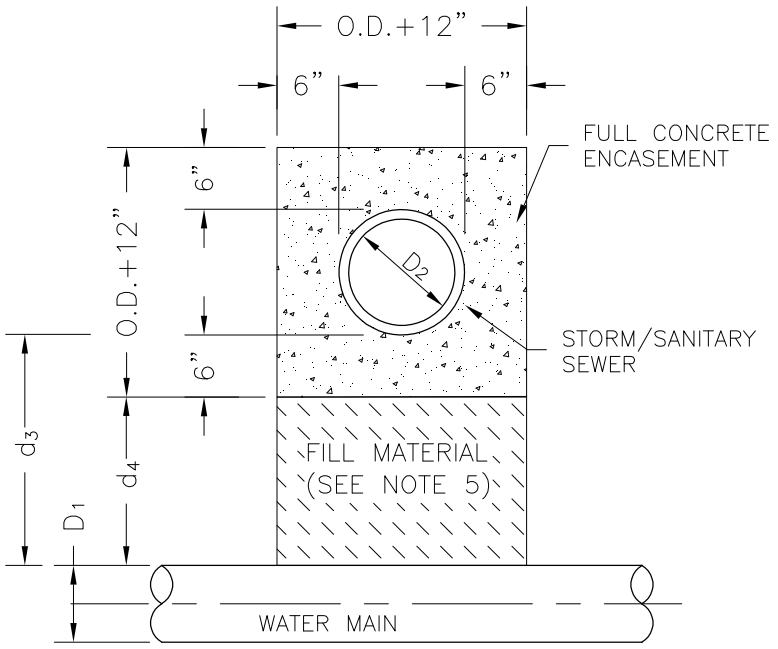
N.T.S.

	STANDARDS & SPECIFICATIONS	REVISED:	STORM SEWER MANHOLE LID
DATE:		DRAWING NO. 400-39	



STORM OR SANITARY SEWER CROSSING UNDER WATER MAIN

IF d_3>18", ENCASEMENT NOT REQUIRED



NOTES:

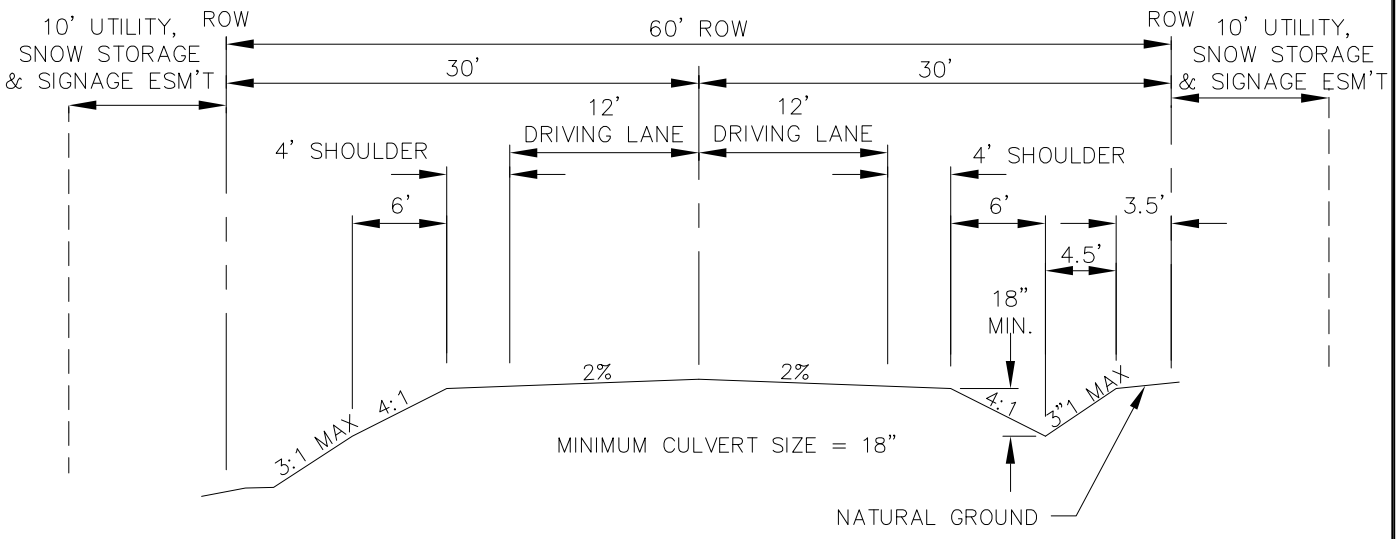
1. CONCRETE COLLAR AROUND STORM SEWER JOINTS MAY BE ACCEPTED WITH WRITTEN APPROVAL BY THE CITY ENGINEER AND ONLY FOR PIPE 30" OR LARGER.
2. CONCRETE TO BE CAST AGAINST UNDISTURBED SOIL OR SHORING.
3. LENGTH OF ENCASEMENT SHALL EXTEND AT LEAST 10–FEET EACH SIDE OF WATER MAIN.
4. UNLESS OTHERWISE NOTED ON PLAN/PROFILE DRAWINGS, ENCASEMENTS NEED NOT BE REINFORCED.
5. FILLER MATERIAL BETWEEN CONDUITS TO BE:
   a) APPROVED COMPRESSIBLE MATERIAL SUCH AS STYROFOAM, ETC. IF $d_4 \leq 6$".
   b) COMPACTED BACKFILL, IF $d_4 > 6$".
6. SHORING OR SHEETING, IF USED, TO BE CUT OFF AT TOP OF ENCASEMENT

STORM OR SANITARY SEWER CROSSING OVER TOP OF WATER MAIN

ENCASEMENT REQUIRED REGARDLESS OF DIMENSION d_3
(SEE NOTE 1 FOR SPECIAL CASES)

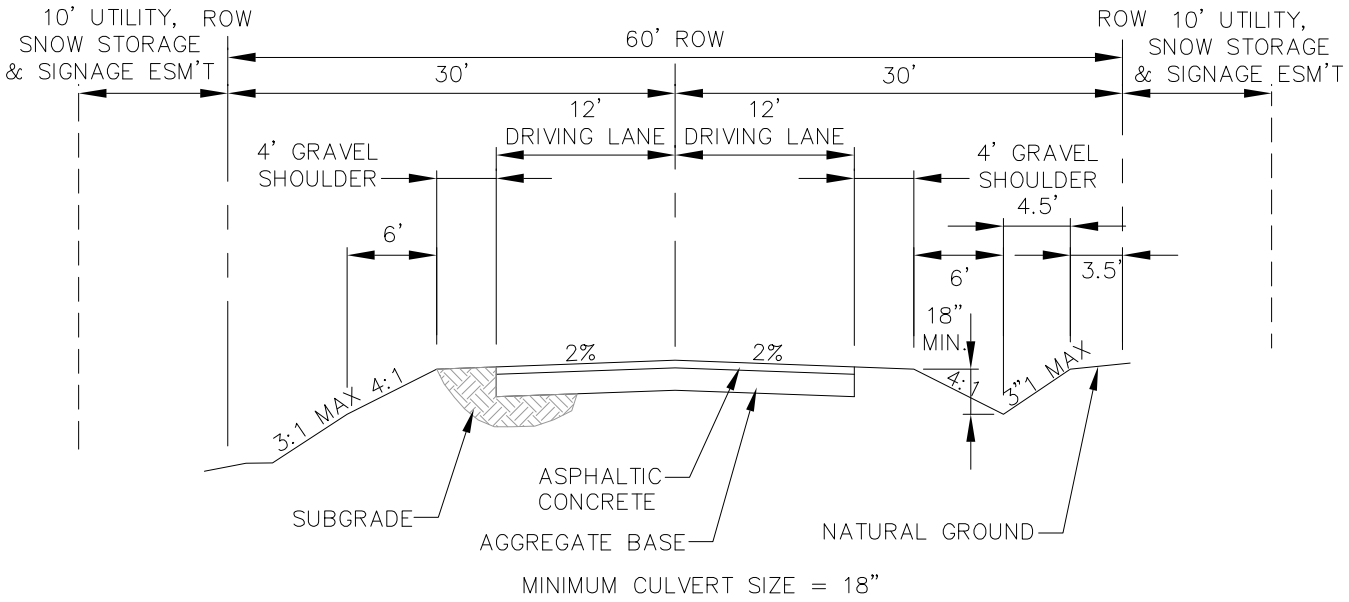
N.T.S.

STANDARDS & SPECIFICATIONS	REVISED:	ENCASEMENT FOR CONDUIT CROSSINGS
DATE:	DRAWING NO. 400–40	



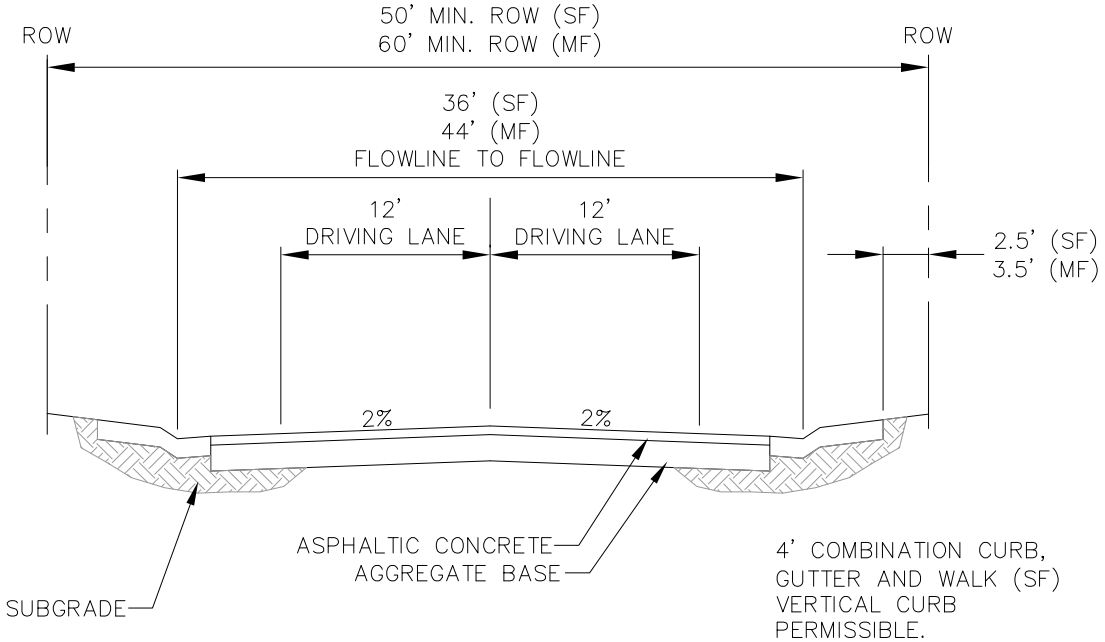
N.T.S.

	STANDARDS & SPECIFICATIONS	REVISED:	LOCAL ROAD TYPE I (GRAVEL)
DATE:	DRAWING NO. 500-01		



MINIMUM CULVERT SIZE = 18"

LOCAL TYPE II (ASPHALT)
W/GRAVEL SHOULDERS



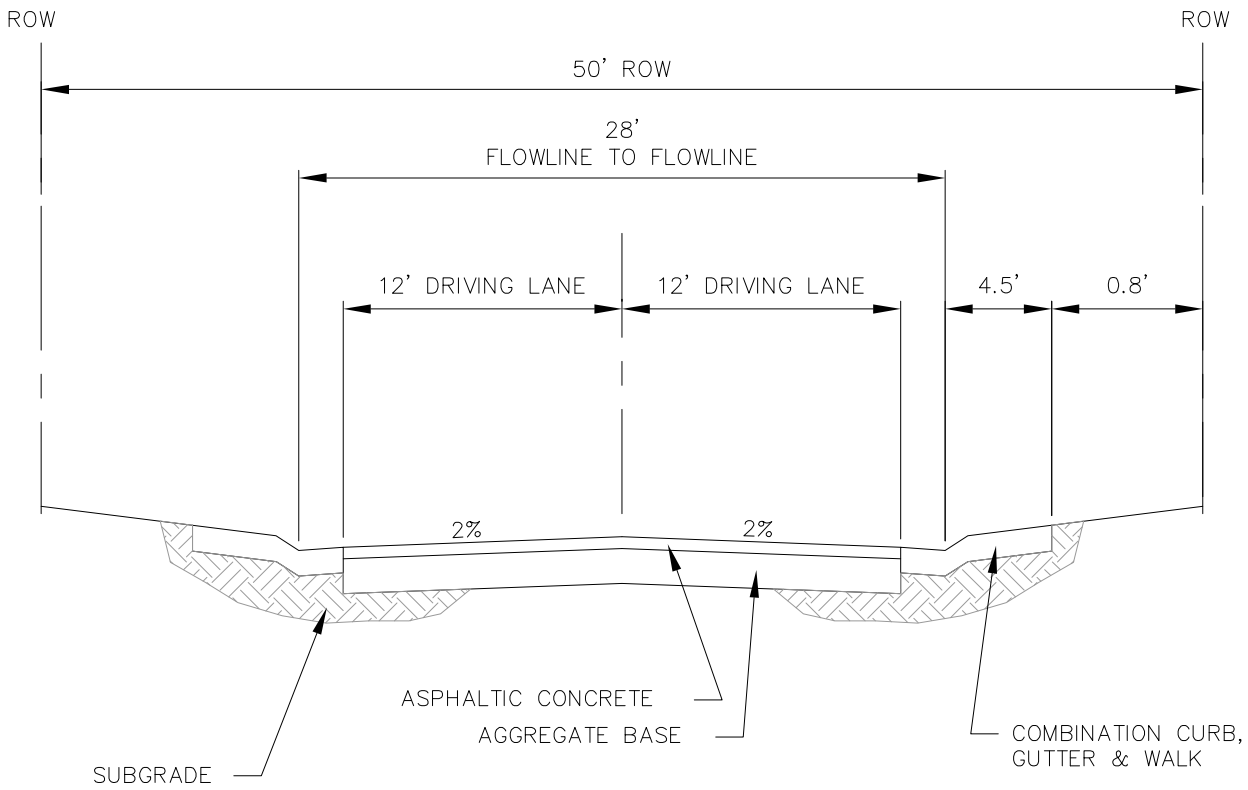
4' COMBINATION CURB, GUTTER AND WALK (SF) VERTICAL CURB PERMISSIBLE.

5' COMBINATION CURB, GUTTER AND WALK (MF) VERTICAL CURB PERMISSIBLE.

LOCAL TYPE II (ASPHALT)

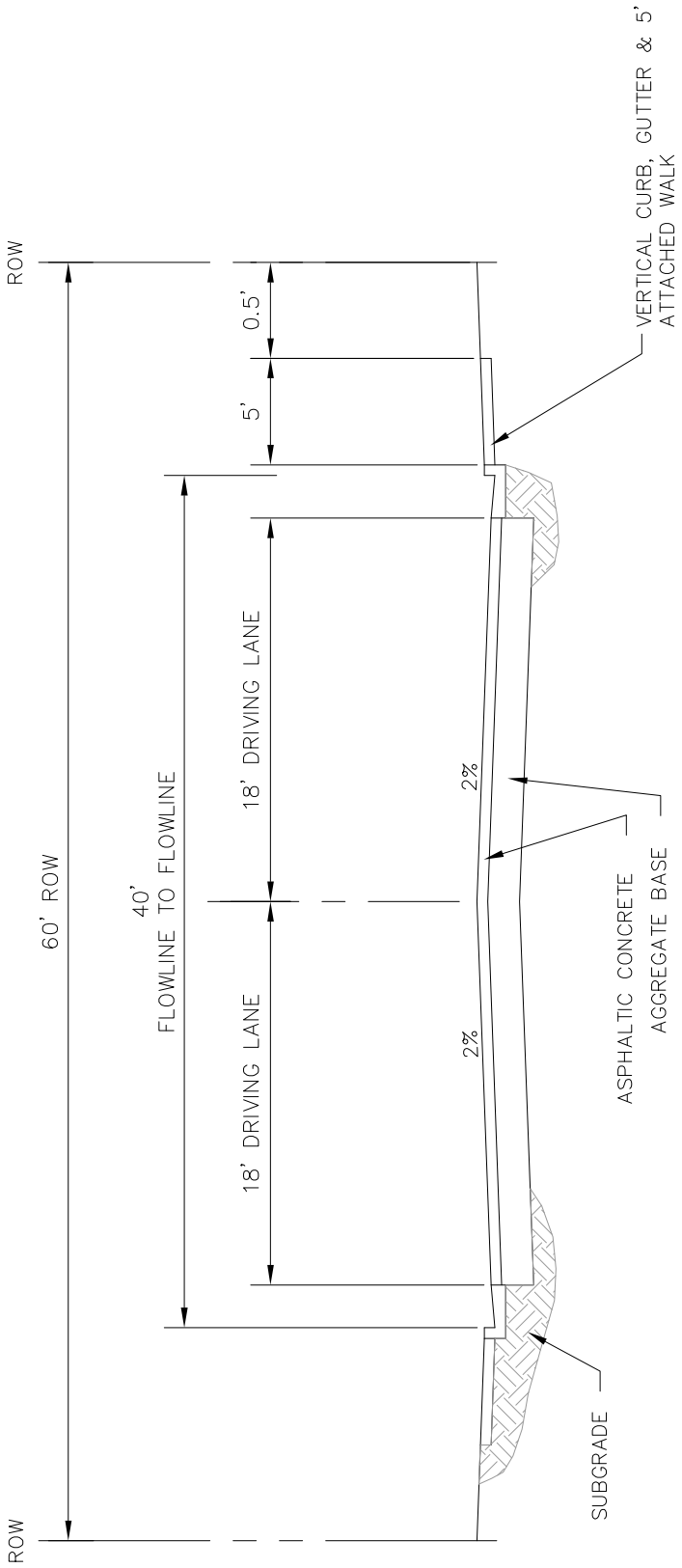
N.T.S.

	STANDARDS & SPECIFICATIONS	REVISED:	LOCAL ROAD TYPE II
DATE:		DRAWING NO. 500-02	



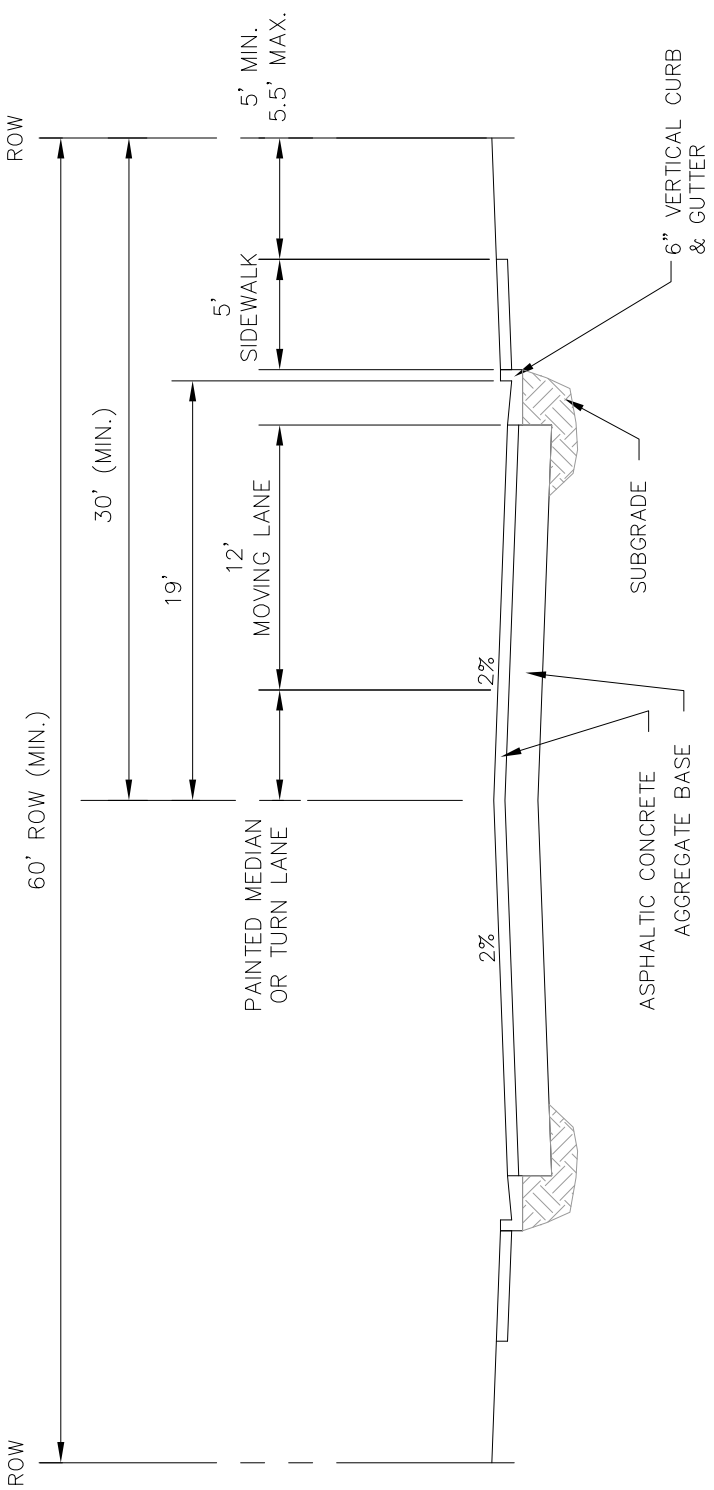
N.T.S.

	STANDARDS & SPECIFICATIONS	REVISED:
DATE:	DRAWING NO. 500–03	LOCAL ROAD TYPE III



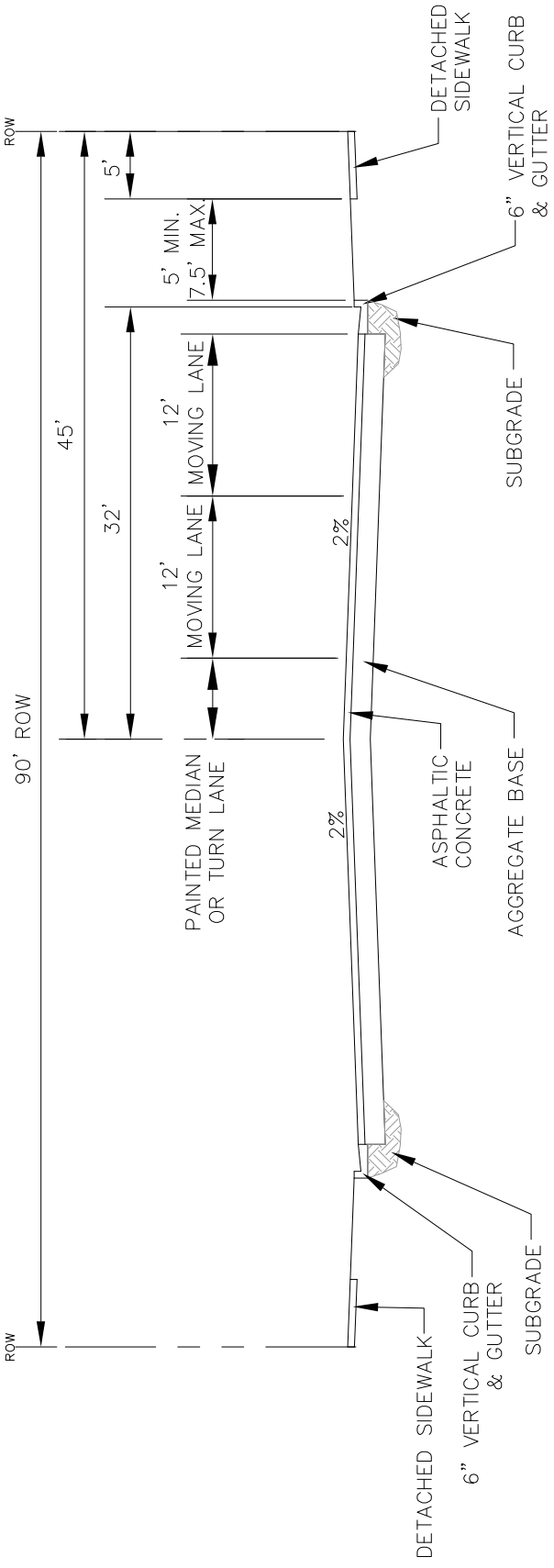
N.T.S.

	STANDARDS & SPECIFICATIONS	REVISED:	LOCAL ROAD TYPE IV COMMERCIAL AND INDUSTRIAL
DATE:		DRAWING NO. 500-04	



N.T.S.

	STANDARDS & SPECIFICATIONS	REVISED:	MINOR COLLECTOR 60' ROW
DATE:		DRAWING NO. 500–05	



N.T.S.

	STANDARDS & SPECIFICATIONS	REVISED:	MAJOR COLLECTOR 90' ROW
DATE:		DRAWING NO. 500–06	

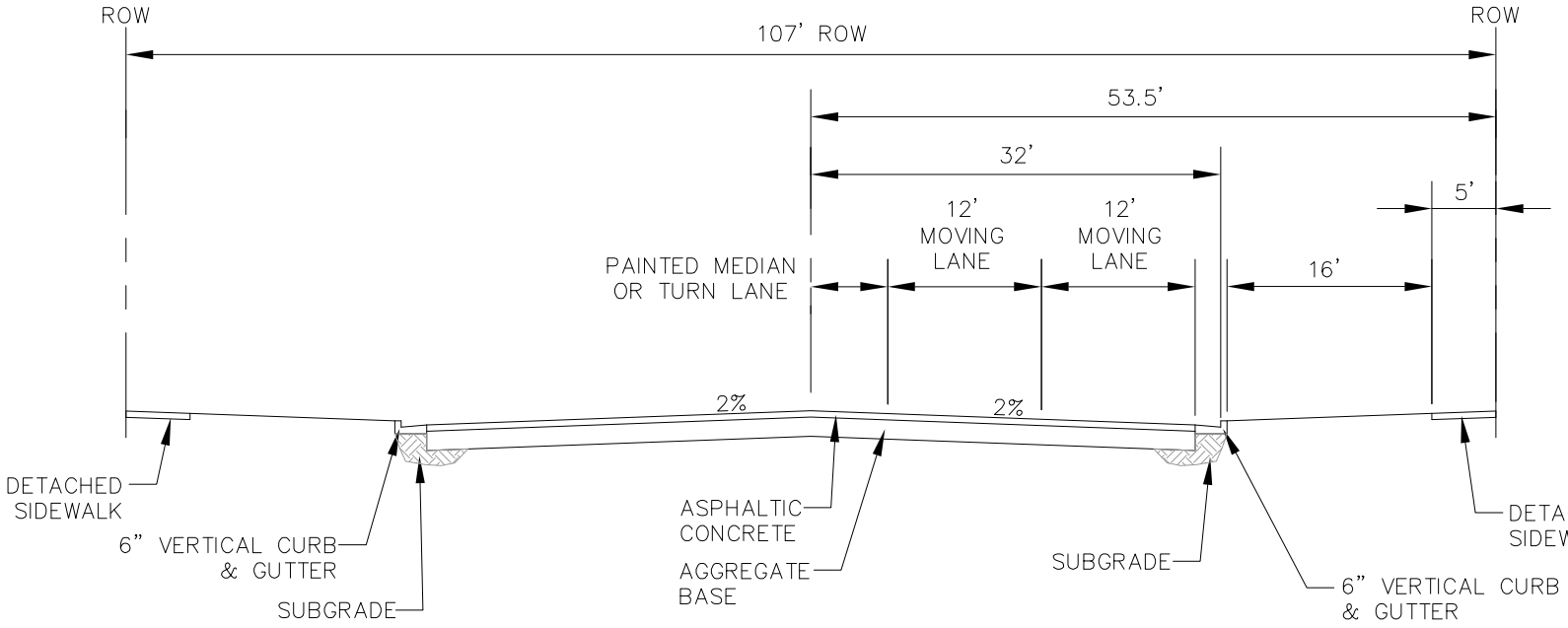
DATE:

STANDARDS & SPECIFICATIONS

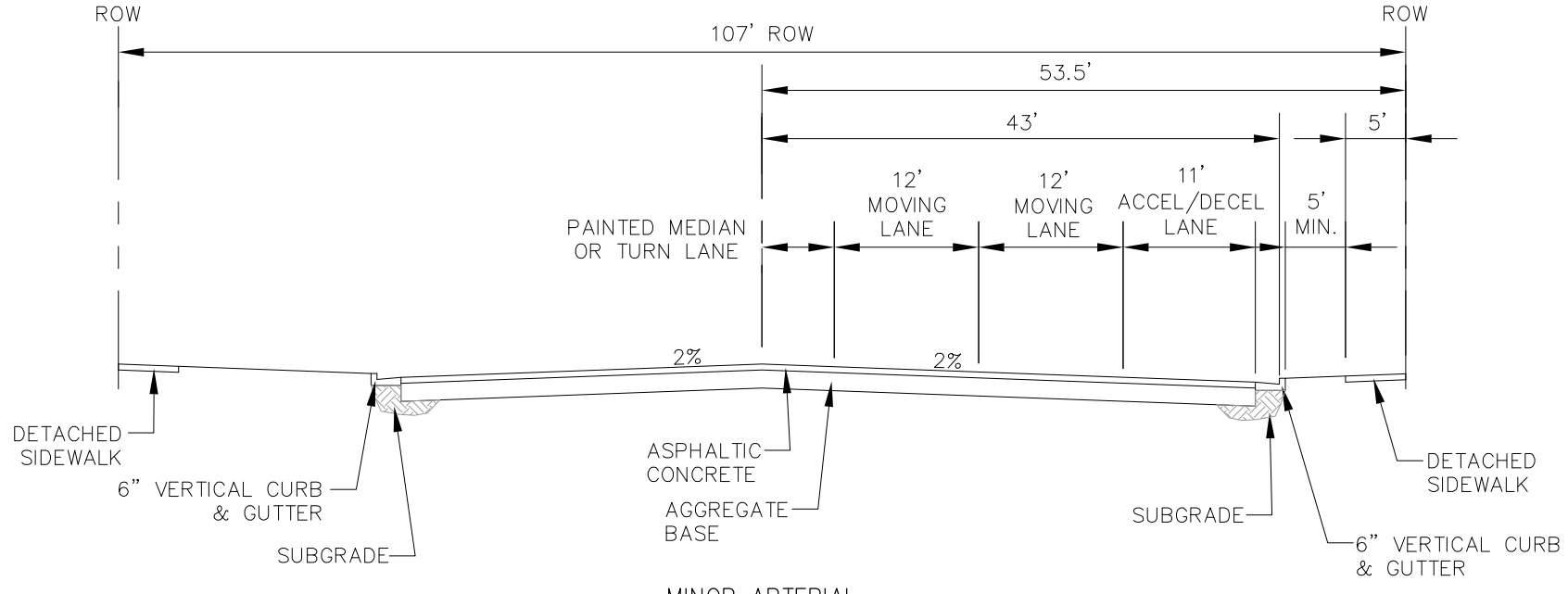
DRAWING NO. 500-07

REVISED:

MINOR ARTERIAL

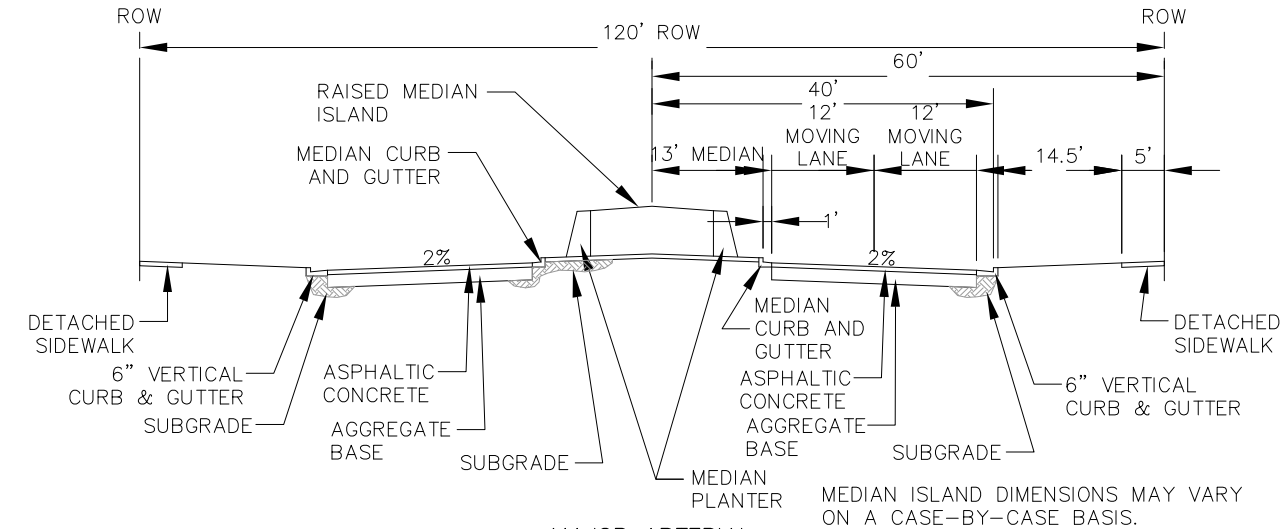


MINOR ARTERIAL

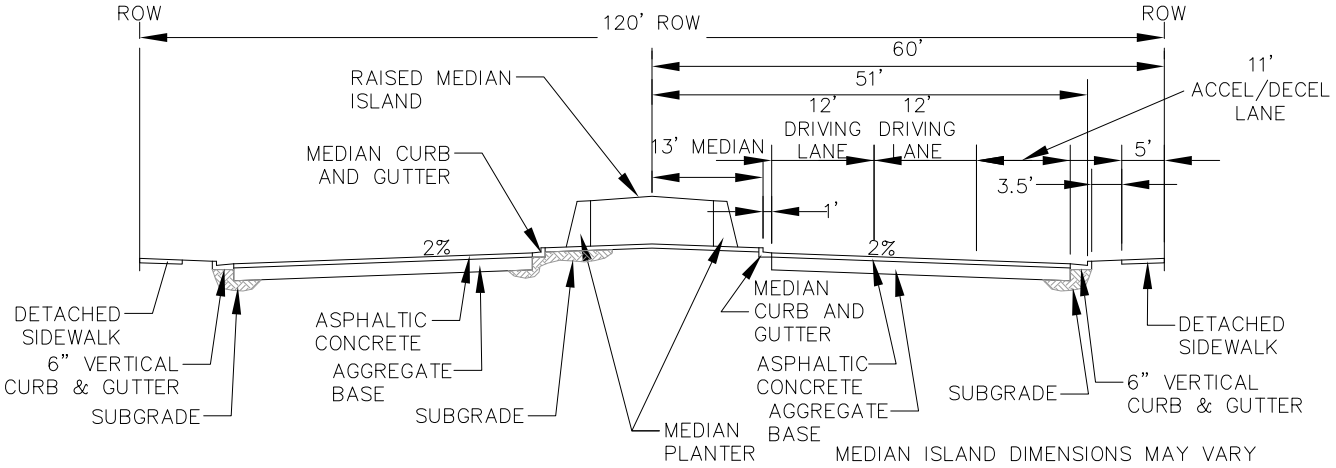


N.T.S.

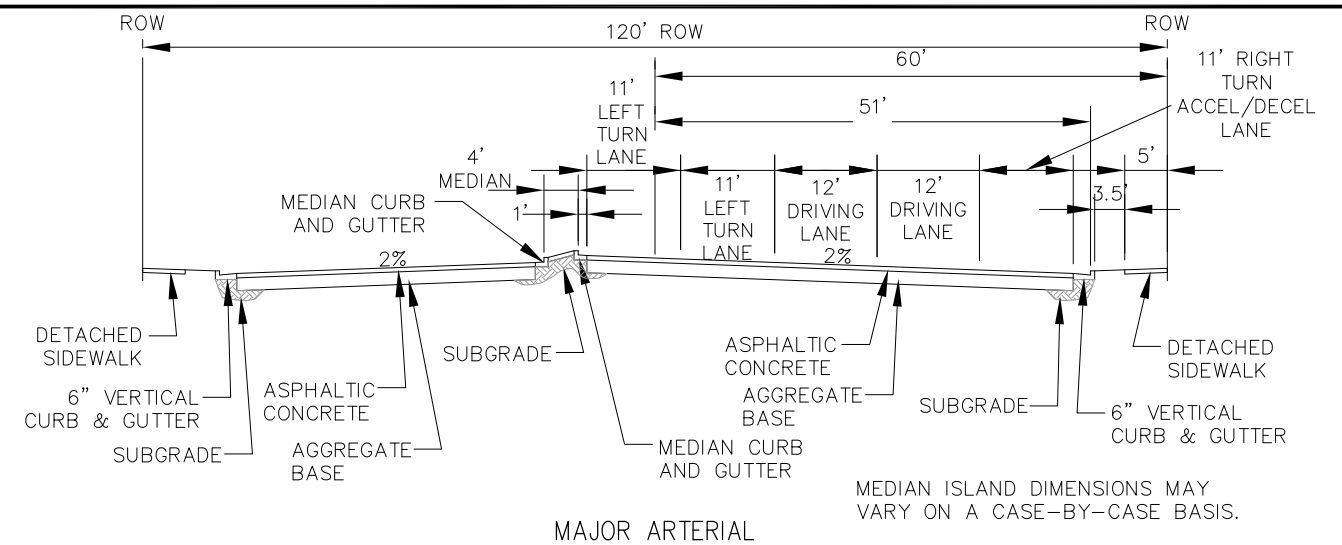
MINOR ARTERIAL
W/ACCEL/DECEL LANE



MAJOR ARTERIAL
4 LANE



MAJOR ARTERIAL
4 LANE W/ACCEL/DECEL LANES



MAJOR ARTERIAL
4 LANE W/TURN LANES

N.T.S.

	STANDARDS & SPECIFICATIONS	REVISED:	MAJOR ARTERIAL
DATE:		DRAWING NO. 500-08	

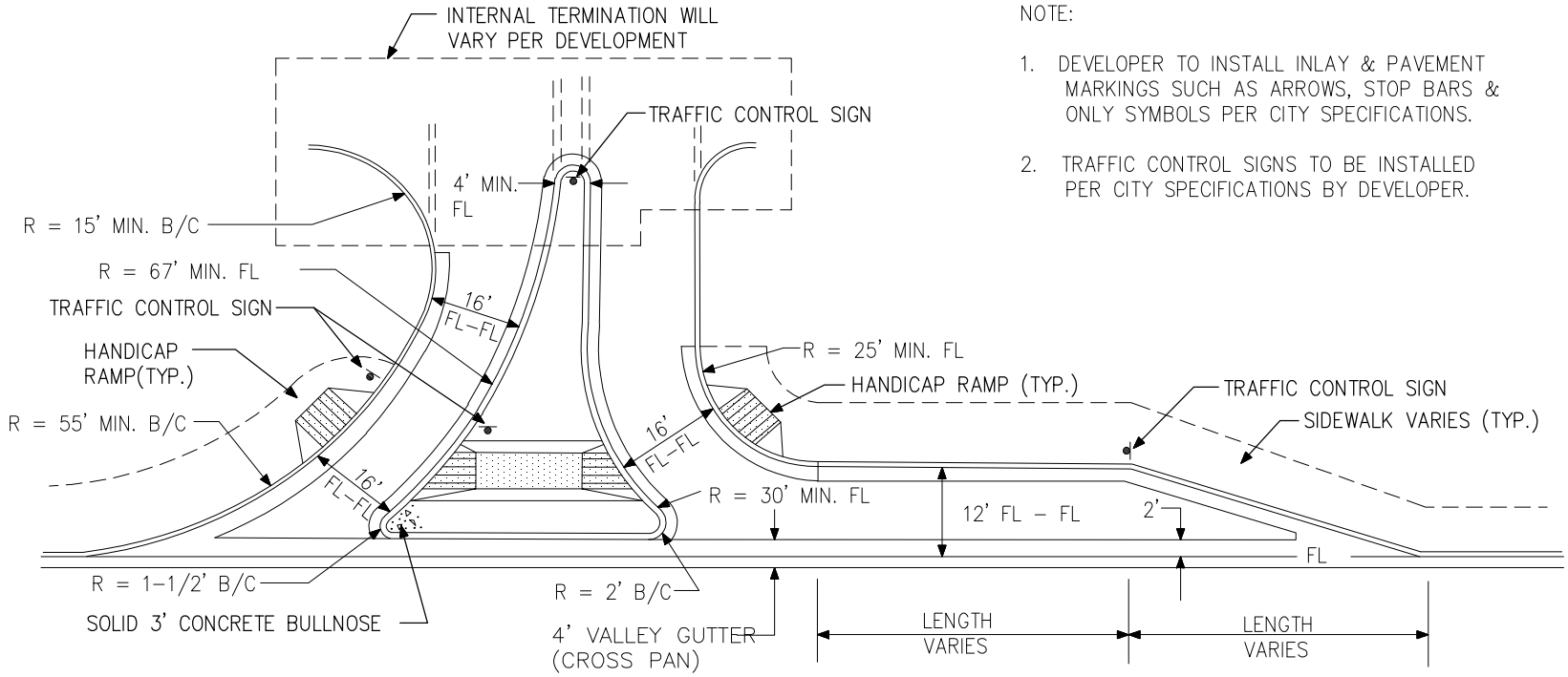
DATE:

STANDARDS & SPECIFICATIONS

DRAWING NO. 500-09

REVISED:

RIGHT IN - RIGHT OUT ACCESS FOR ARTERIAL ROADWAY

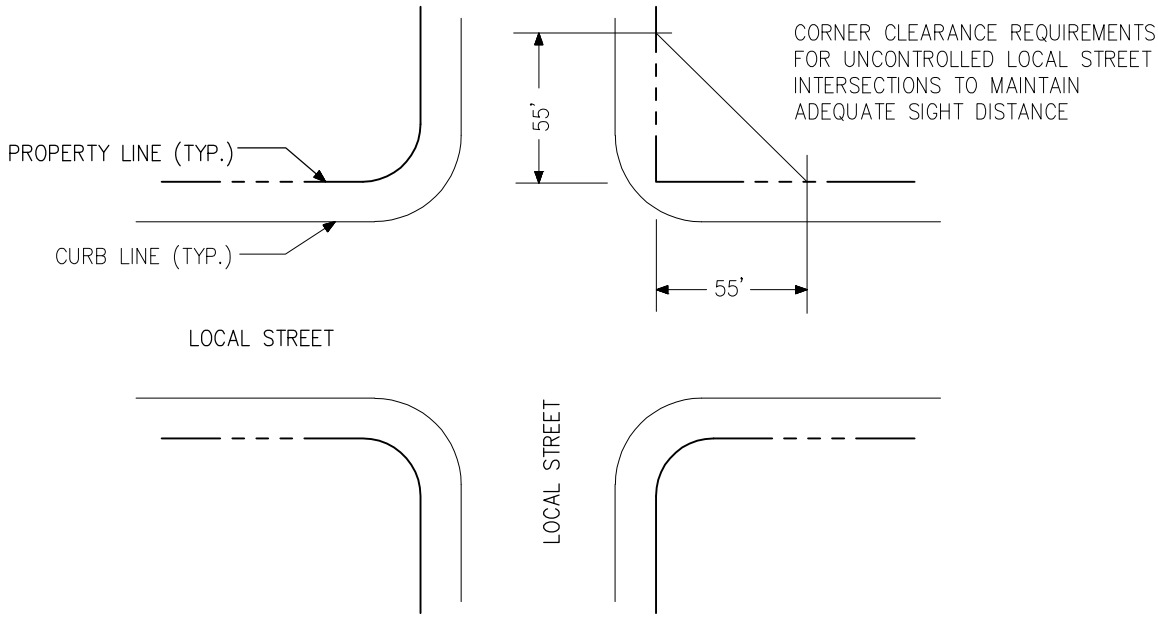


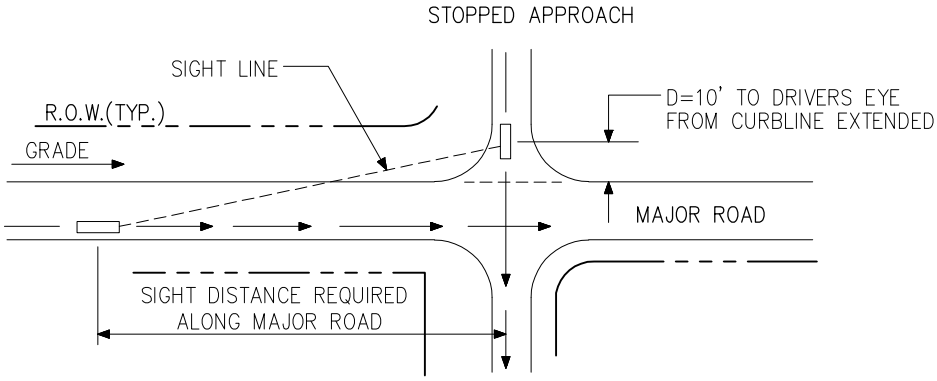
NOTE:

1. DEVELOPER TO INSTALL INLAY & PAVEMENT MARKINGS SUCH AS ARROWS, STOP BARS & ONLY SYMBOLS PER CITY SPECIFICATIONS.
2. TRAFFIC CONTROL SIGNS TO BE INSTALLED PER CITY SPECIFICATIONS BY DEVELOPER.

THE GROOVED RECTANGULAR PORTION OF THE RAMP AND GUTTER SHALL BE INTEGRAL DAVIS COLOR TILE RED (3 POUNDS OF COLOR PIGMENT NO. 1117 PER SACK OF CEMENT) AND SHALL BE CURED WITH CLEAR CURING COMPOUND

N.T.S.

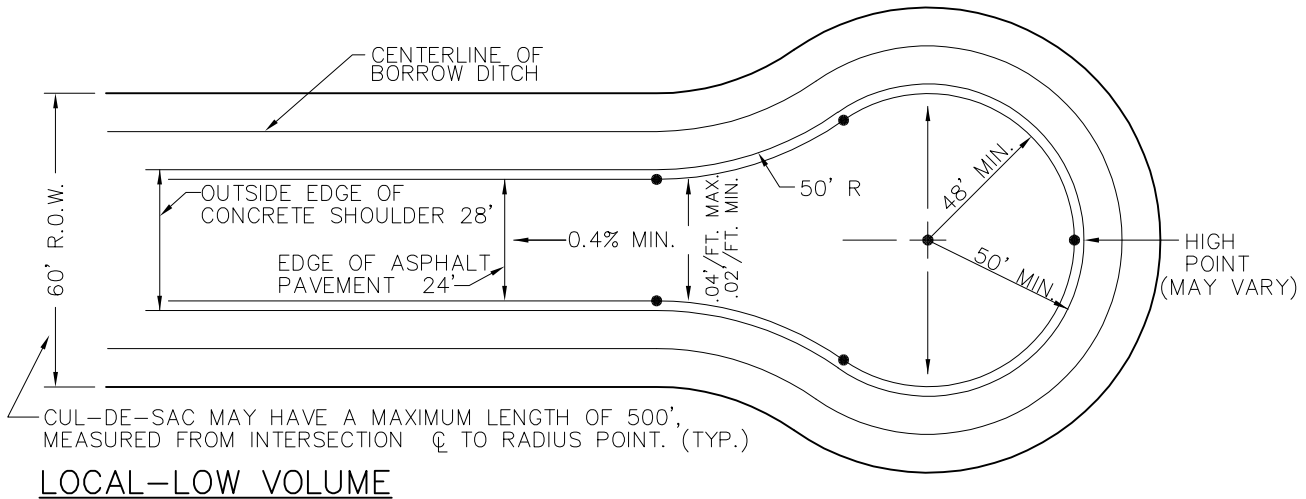




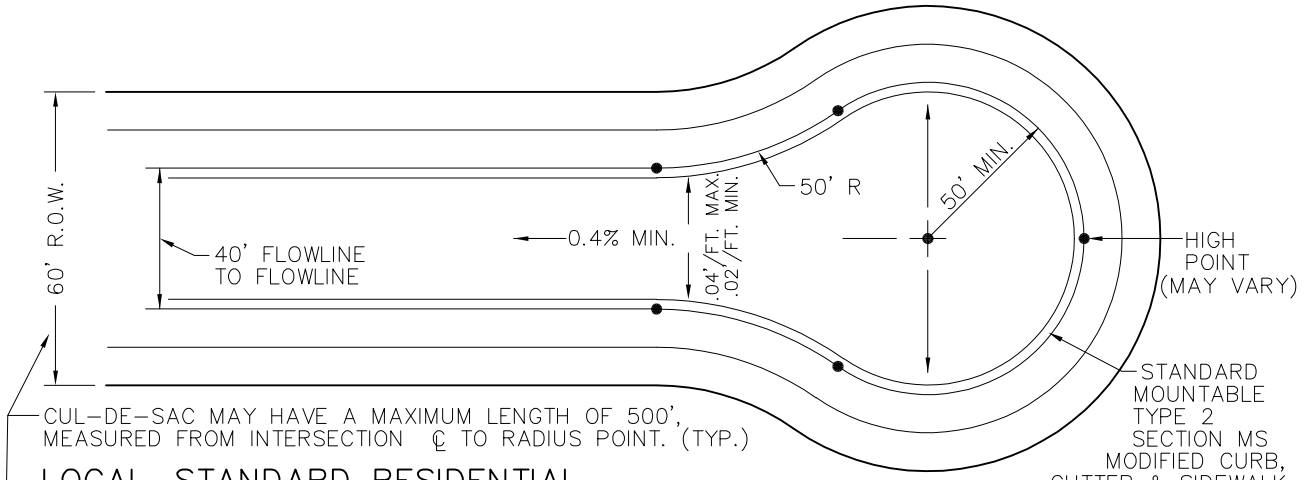
DESIGN SPEED OF THRU ROADWAY (MPH)	MINIMUM SIGHT DISTANCE FOR STOPPED VEHICLE (FT.)	GRADE CORRECTION DISTANCE (FT.) SPEED	UPGRADE TO		FOR DOWNGRADES	
			3%	6%	3%	6%
25	250	25	0	−10	+10	+20
30	300	30	0	−10	+10	+20
35	350	35	−10	−15	+10	+25
40	400	40	−10	−20	+10	+30
45	450	45	−15	−25	+15	+40

N.T.S.

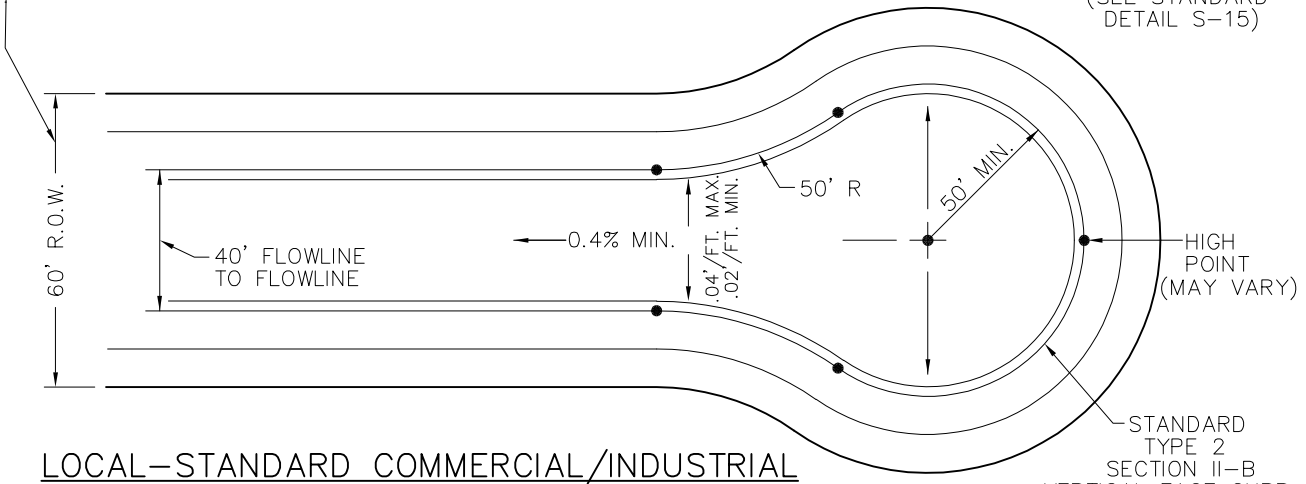
	STANDARDS & SPECIFICATIONS	REVISED:	SIGHT DISTANCE
DATE:		DRAWING NO. 500−10	



LOCAL–LOW VOLUME



LOCAL–STANDARD RESIDENTIAL



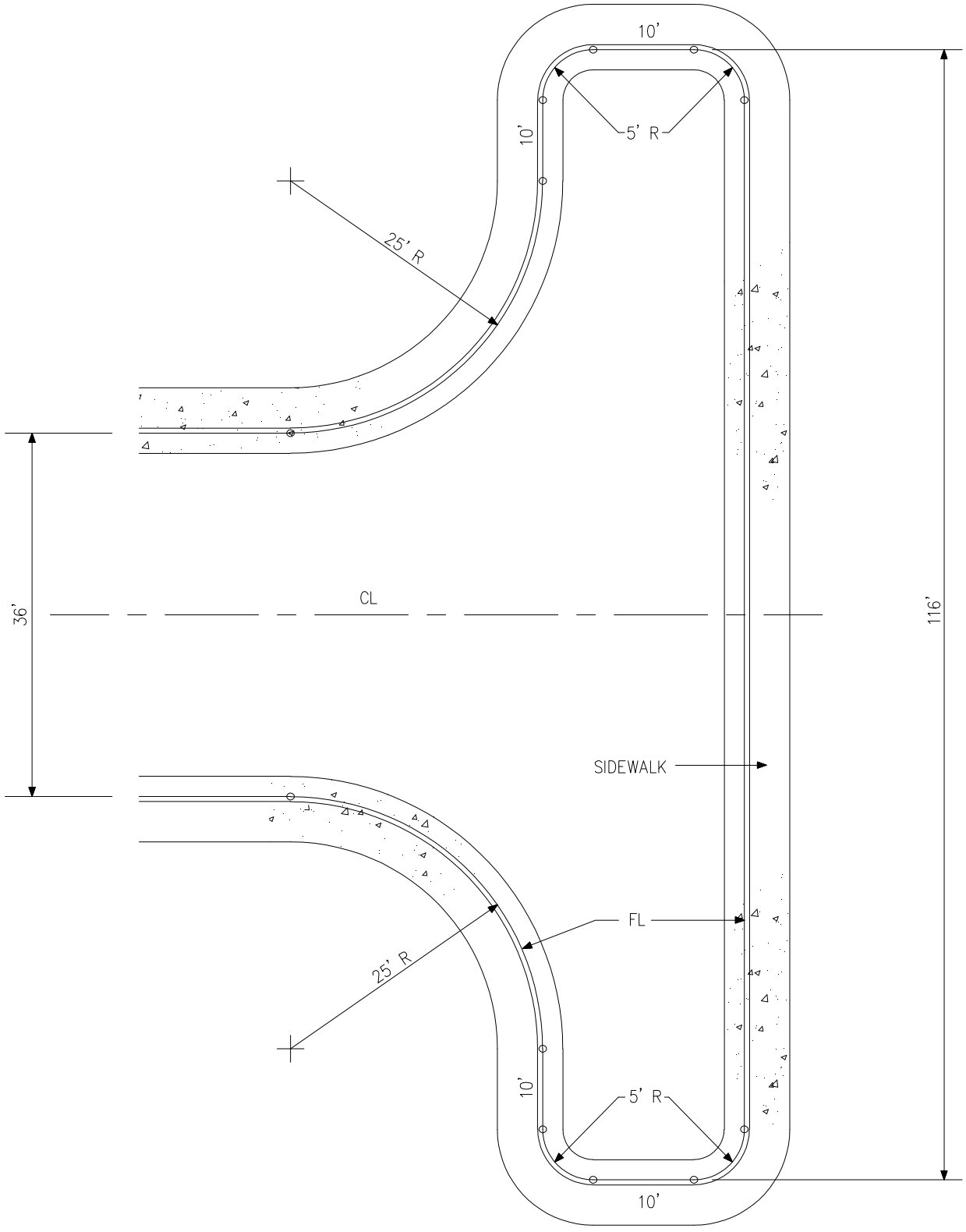
LOCAL–STANDARD COMMERCIAL/INDUSTRIAL

NOTE: THESE STANDARDS MAY BE APPLIED TO ASYMMETRICAL CUL–DE–SACS.

- DESIGN ENGINEER SHOW REFERENCE ELEVATIONS AT THESE POINTS.

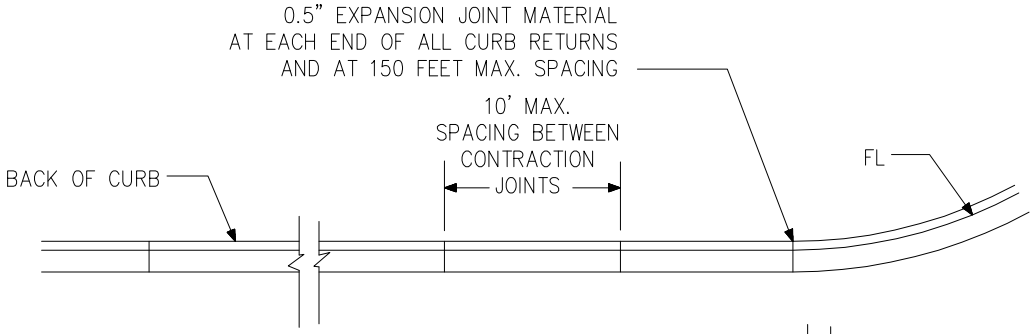
N.T.S.

	STANDARDS & SPECIFICATIONS	REVISED:	CUL-DE-SAC DETAIL
DATE:		DRAWING NO. 500–11	

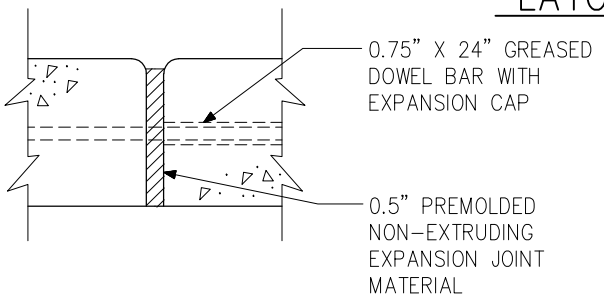


N.T.S.

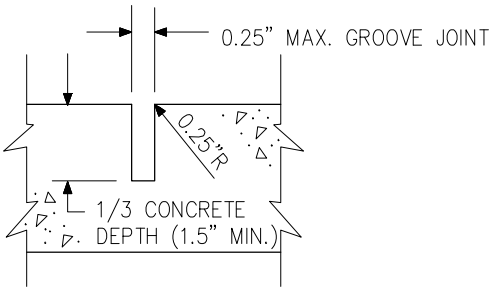
	STANDARDS & SPECIFICATIONS	REVISED:
DATE:	DRAWING NO. 500–12	HAMMERHEAD CUL-DE-SAC



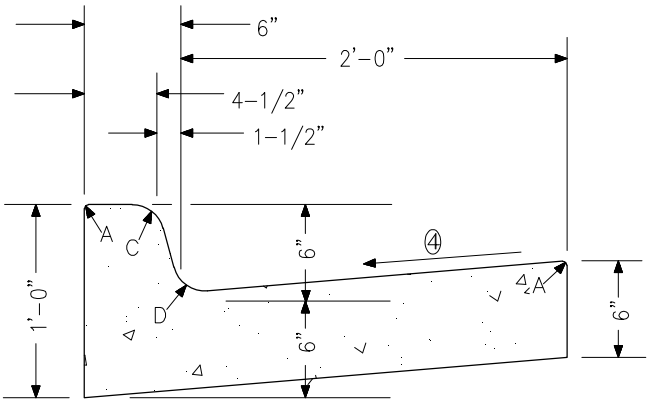
LAYOUT



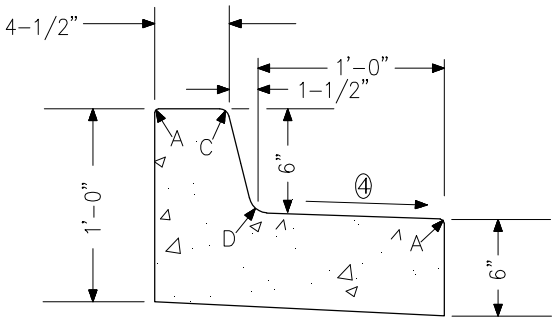
EXPANSION JOINT



CONTRACTION JOINT



6" VERTICAL CURB & GUTTER



6" VERTICAL MEDIAN CURB & GUTTER

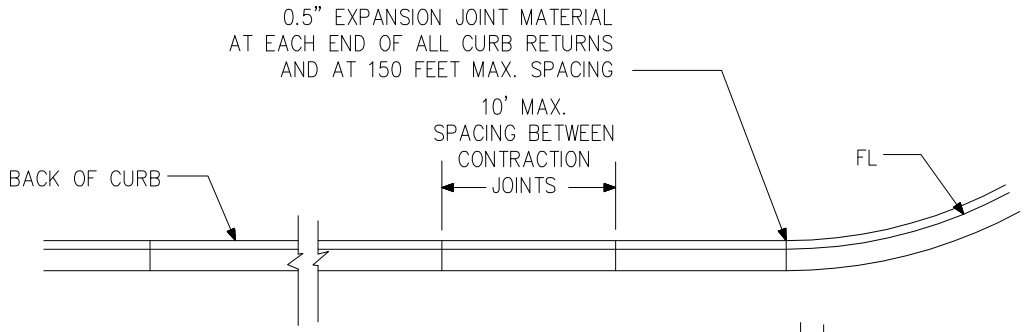
LEGEND FOR RADII
A = 1/8" TO 1/4"
B = 1"
C = 1-1/2"
D = 1-1/2" TO 2"

NOTES:

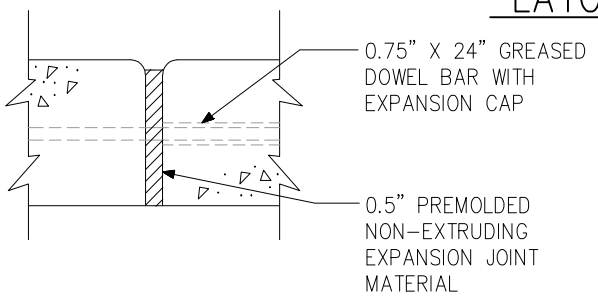
1. EXPANSION JOINT MATERIAL SHALL BE NON-EXTRUDING AND RESILIENT TYPE TO MEET AASHO SPEC. M-213.
2. ANY OVER-EXCAVATION SHALL BE REPLACED WITH GRANULAR BACKFILL COMPACTED TO 95% MAXIMUM DRY DENSITY AS DETERMINED BY ASTM D-698.
3. TYPE 2 SPILL CURB MAY BE REQUIRED FOR SPECIAL CONDITIONS.
4. GUTTER CROSS SLOPE SHALL BE 1/2" /FT. WHEN DRAINING AWAY FROM CURB AND 1" /FT. WHEN DRAINING TOWARD CURB.
5. TYPE 2 CURB & GUTTER IS FOR USE IN COMMERCIAL, ARTERIALS AND COLLECTOR STREETS.

N.T.S.

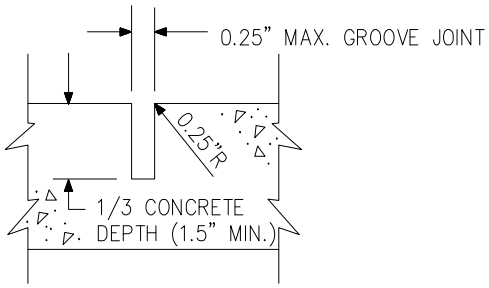
	STANDARDS & SPECIFICATIONS	REVISED:	6" VERTICAL CURB AND GUTTER
DATE:		DRAWING NO. 500-13	



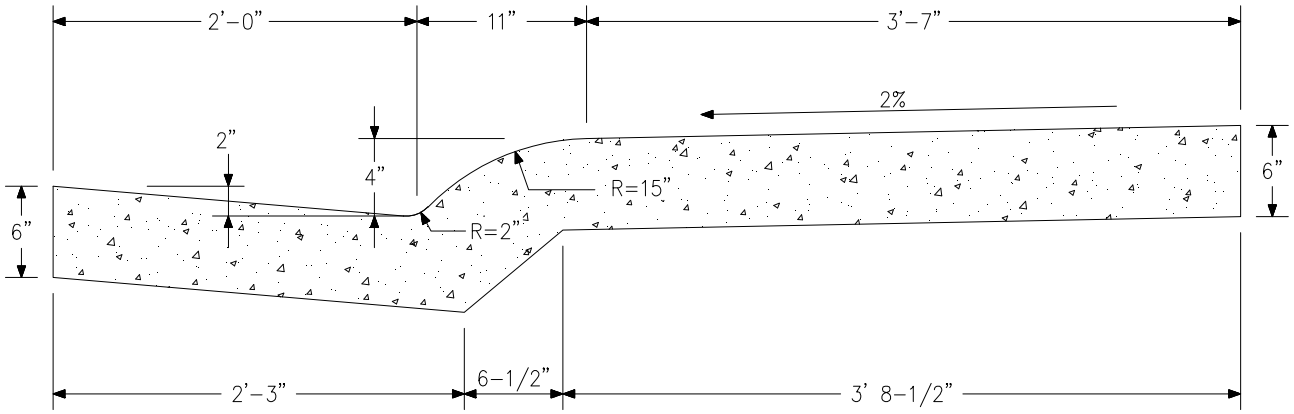
LAYOUT



EXPANSION JOINT



CONTRACTION JOINT

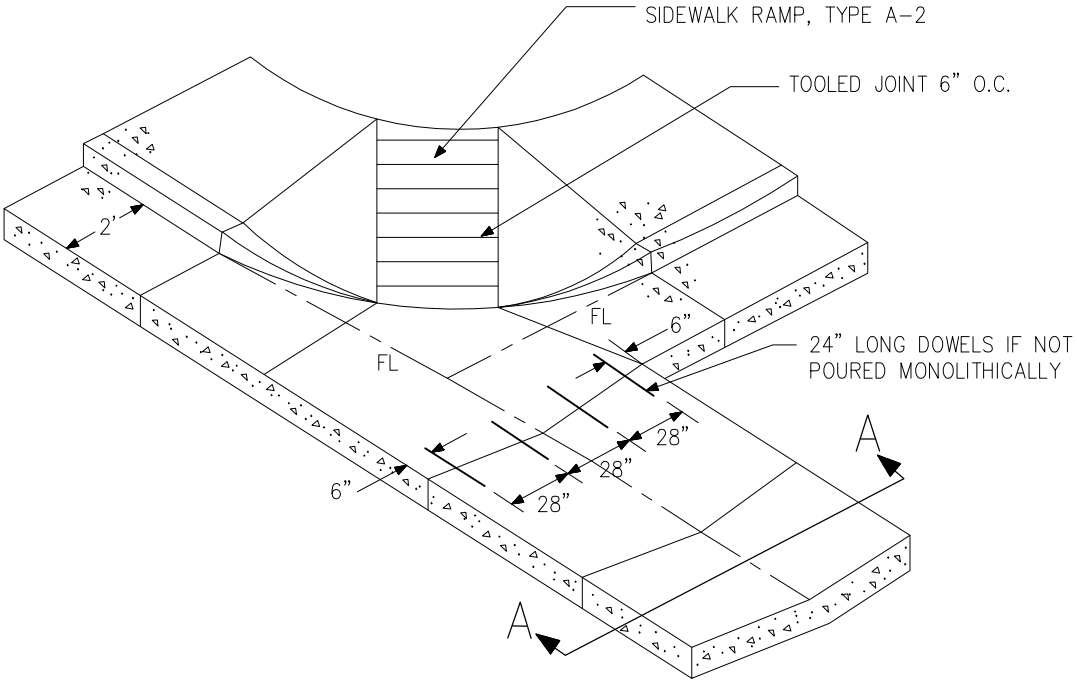


NOTES:

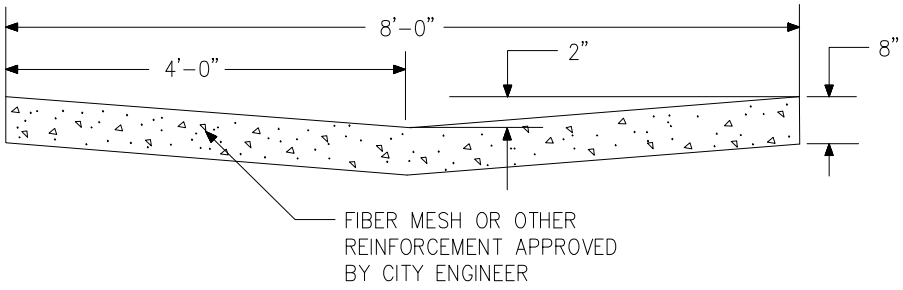
1. EXPANSION JOINT MATERIAL SHALL BE NON-EXTRUDING AND RESILIENT TYPE TO MEET AASHO SPEC. M-213.
2. ANY OVER-EXCAVATION SHALL BE REPLACED WITH GRANULAR BACKFILL COMPACTED TO 95% MAXIMUM DRY DENSITY AS DETERMINED BY ASTM D-698.

N.T.S.

	STANDARDS & SPECIFICATIONS	REVISED:	4" MOUNTABLE CURB, GUTTER AND WALK
DATE:		DRAWING NO. 500-14	



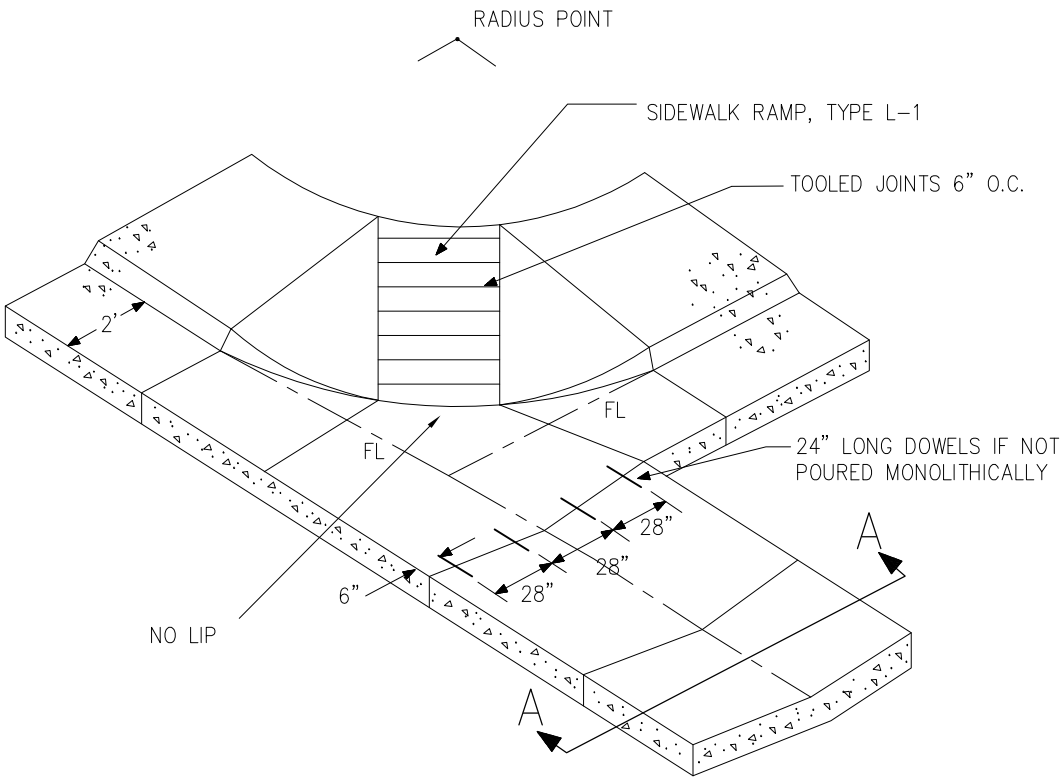
VERTICAL CURB, GUTTER & SIDEWALK



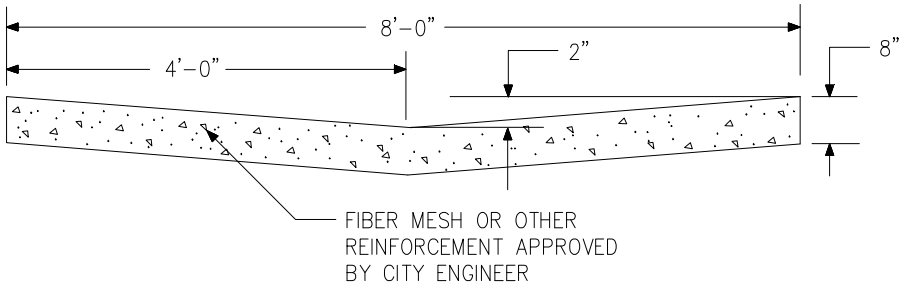
SECTION A-A

N.T.S.

	STANDARDS & SPECIFICATIONS	REVISED:	CROSS PAN INDUSTRIAL/ARTERIAL/ COLLECTOR STREET
DATE:		DRAWING NO. 500-15	



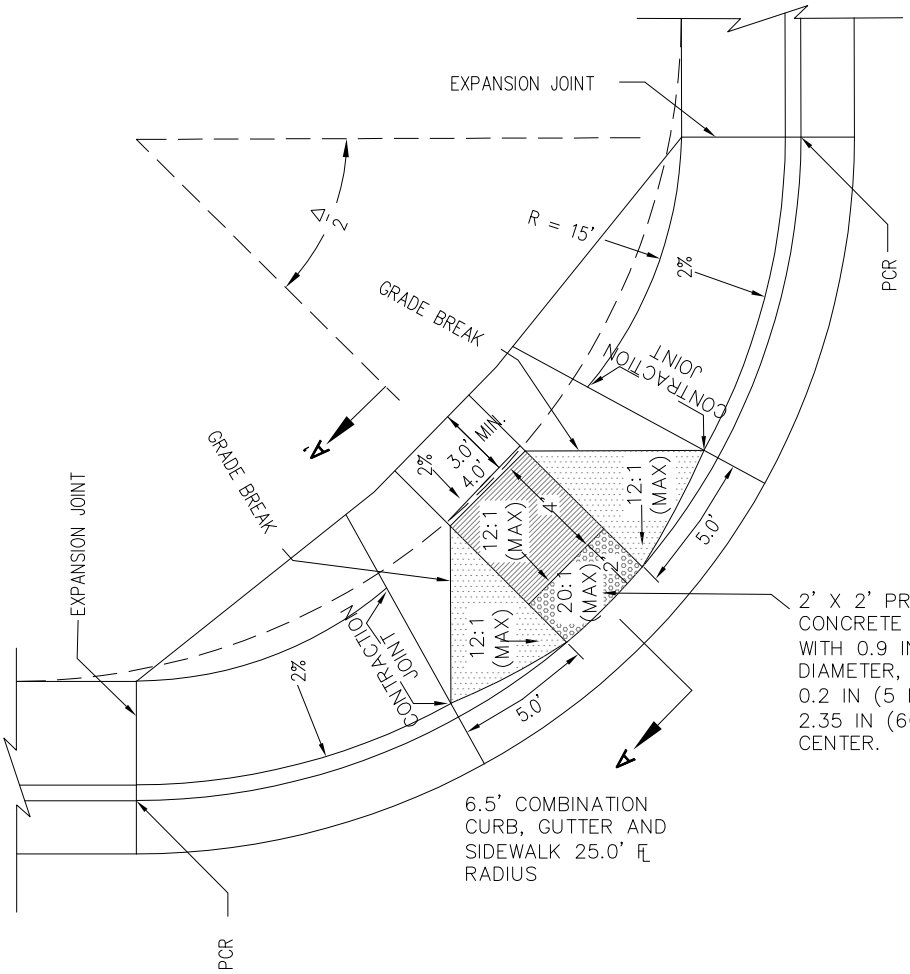
COMBINATION CURB, GUTTER & SIDEWALK TYPE 1

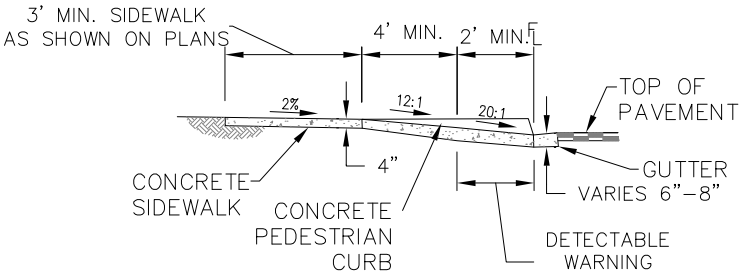


SECTION A-A

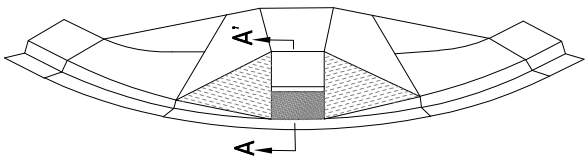
N.T.S.

	STANDARDS & SPECIFICATIONS	REVISED:	CROSS PAN LOCAL STREET
DATE:		DRAWING NO. 500-16	





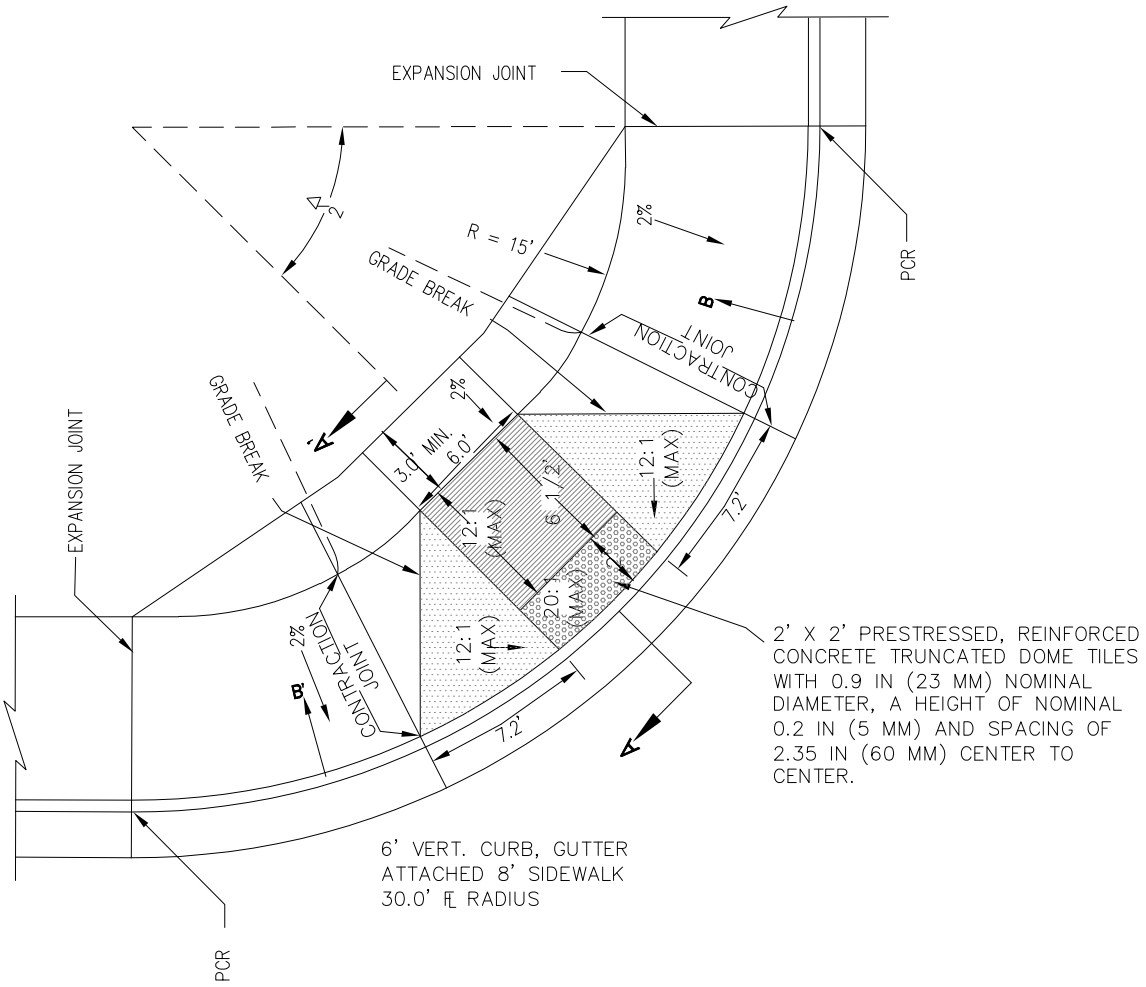
SECTION A'-A

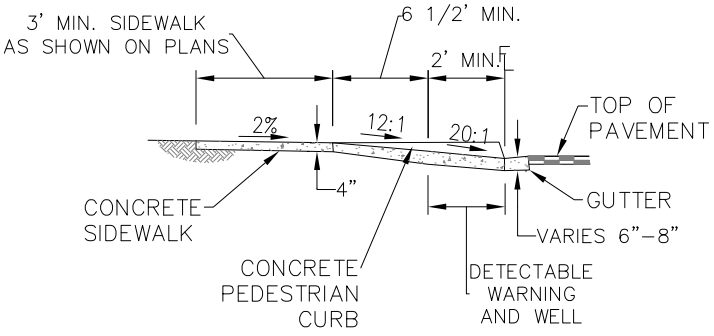


SECTION B-B

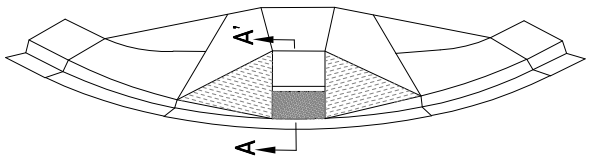
N.T.S.

	STANDARDS & SPECIFICATIONS	REVISED:	COMBINATION CURB, GUTTER AND SIDEWALK
DATE:	DRAWING NO. 500–17		





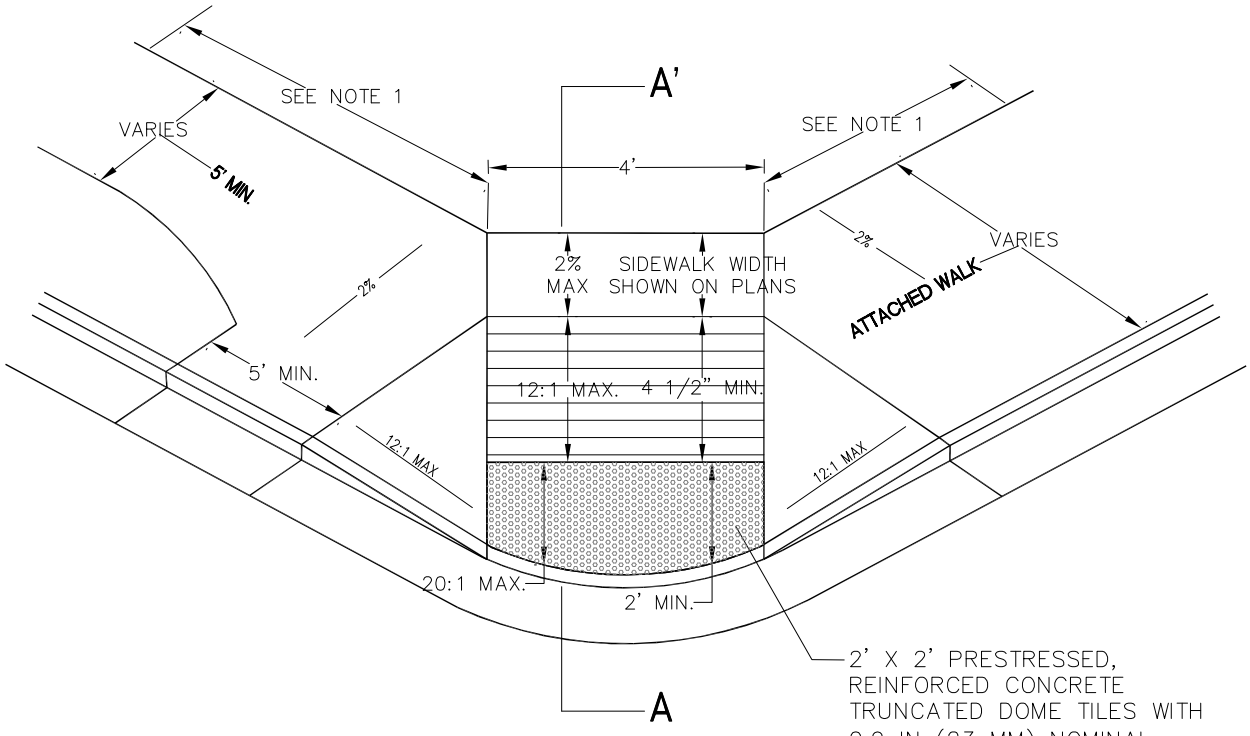
SECTION A'-A

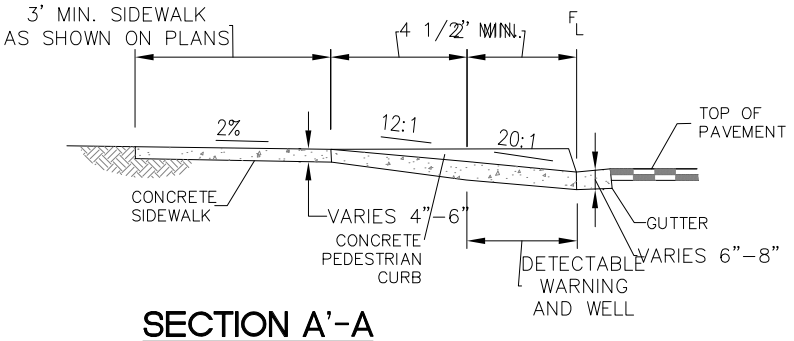


SECTION B-B

N.T.S.

	STANDARDS & SPECIFICATIONS	REVISED:	VERT. CURB, GUTTER, ATTACHED SIDEWALK
DATE:		DRAWING NO. 500–18	





SECTION A'-A

NOTES:

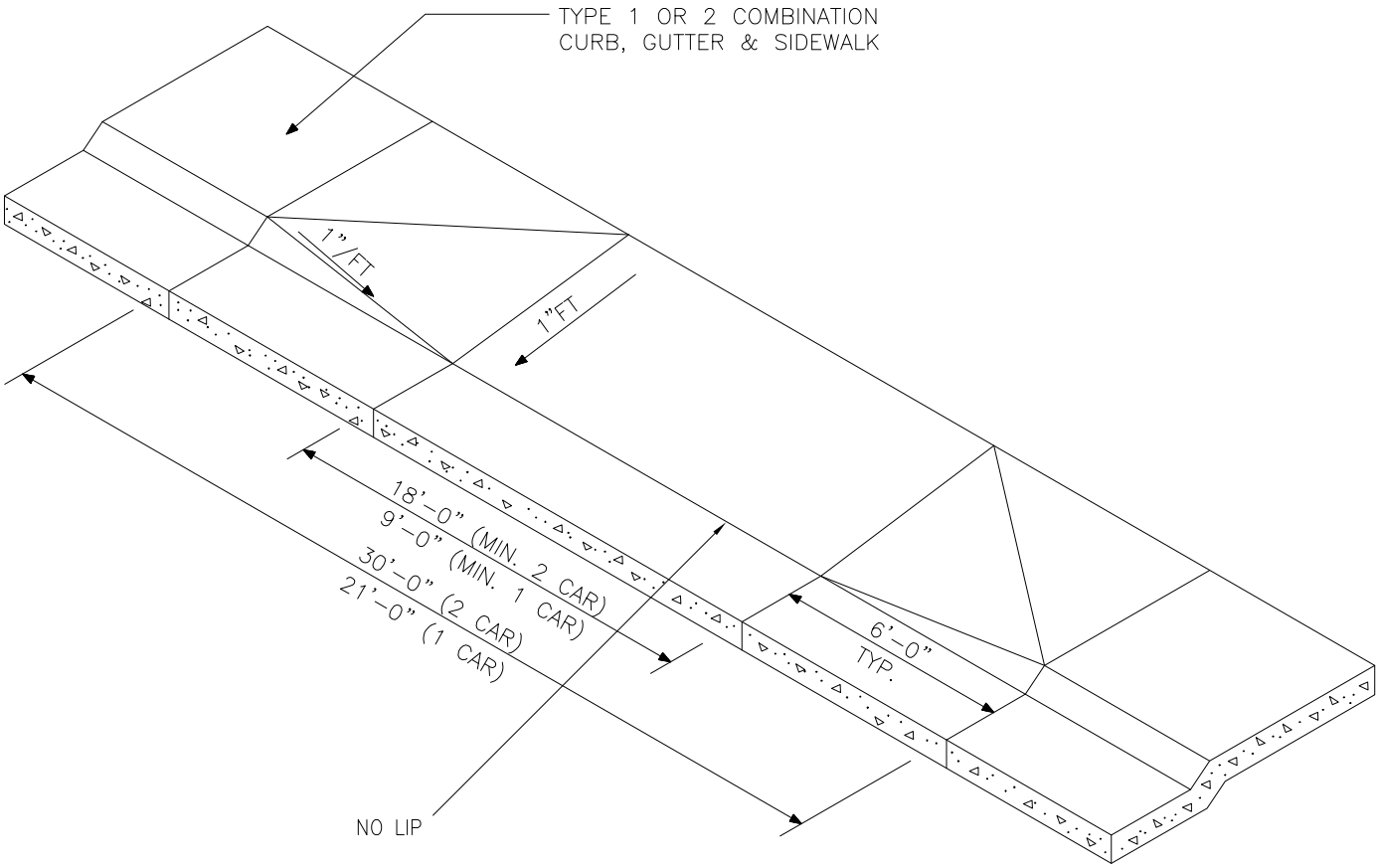
1. HORIZONTAL GEOMETRY OF THE BACK OF WALK VARIES DEPENDING ON THE CURB RADIUS AND PRE-EXISTING PHYSICAL OBSTRUCTIONS. THE DESIGN SHALL ADEQUATELY PROVIDE A MINIMUM WIDTH ROUTE BEHIND THE RAMP WITH AN AESTHETICALLY PLEASING APPEARANCE.

2. 1/2" WIDE X 1/2" DEEP GROOVES SHALL BE SPACED AT 12"

3. THE RAMP AND WINGS SHALL BE TEXTURED WITH A COARSE BROOMED FINISH.

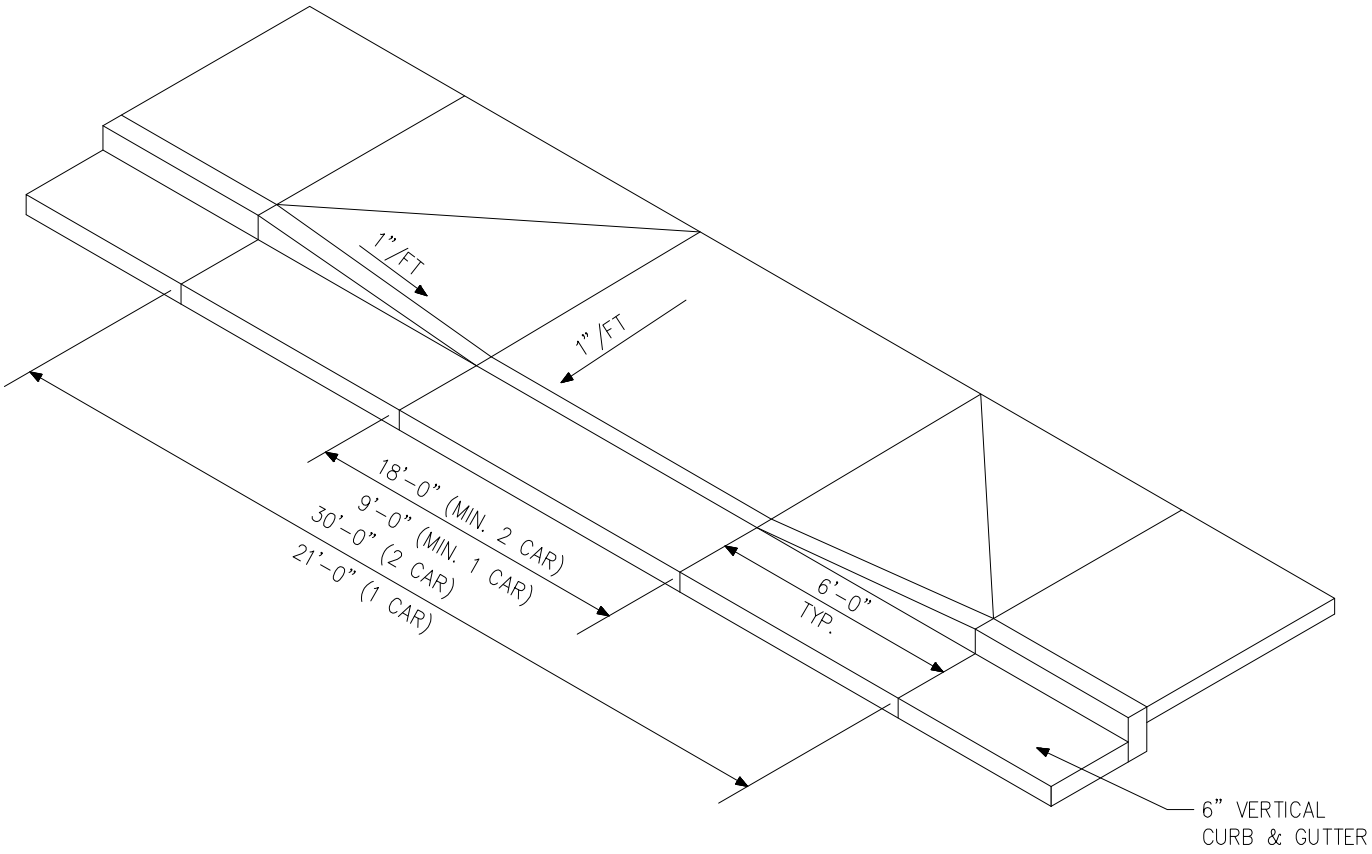
N.T.S.

	STANDARDS & SPECIFICATIONS	REVISED:	VERT. CURB, GUTTER, ATTACHED SIDEWALK
DATE:		DRAWING NO. 500-19	



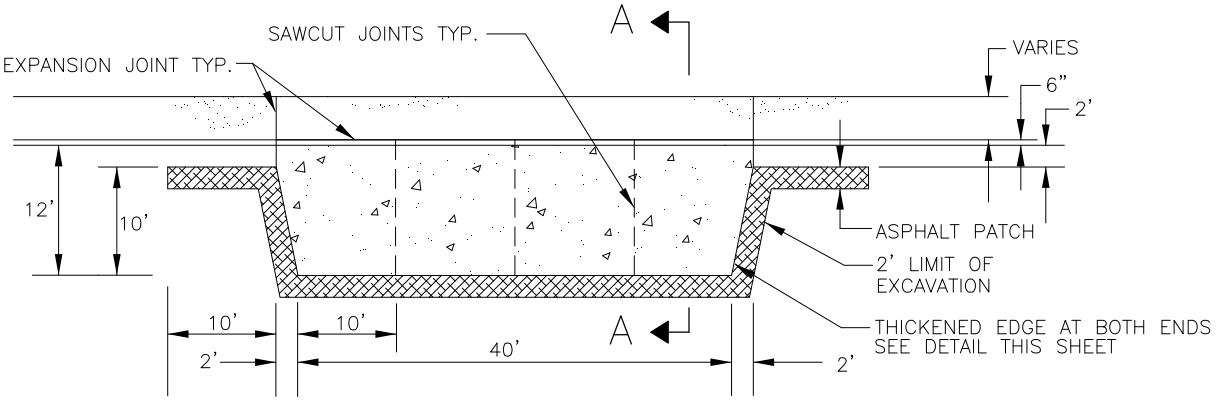
N.T.S.

	STANDARDS & SPECIFICATIONS	REVISED:	DRIVEWAY APRON LOCAL STREET
DATE:	DRAWING NO. 500-20		

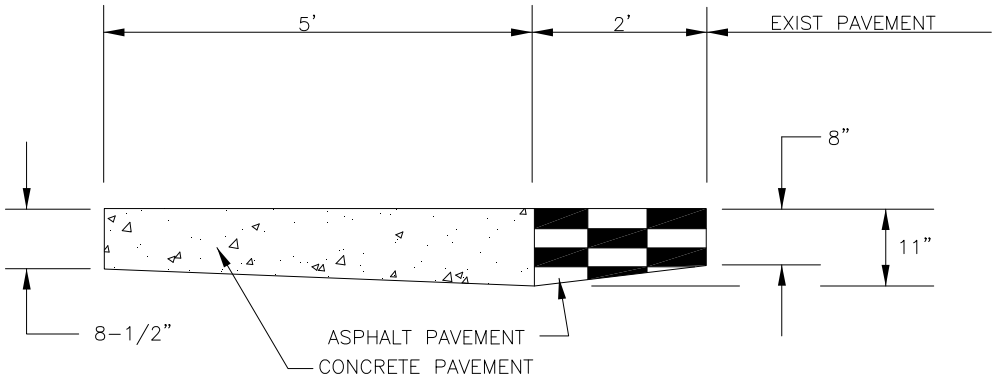


N.T.S.

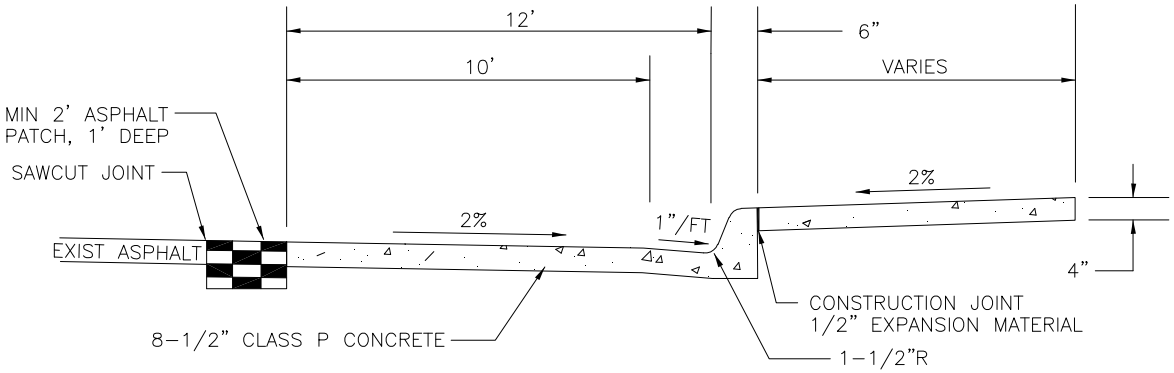
	STANDARDS & SPECIFICATIONS	REVISED:	DRIVEWAY APRON ARTERIAL/COLLECTOR STREET
DATE:	DRAWING NO. 500-21		



PLAN



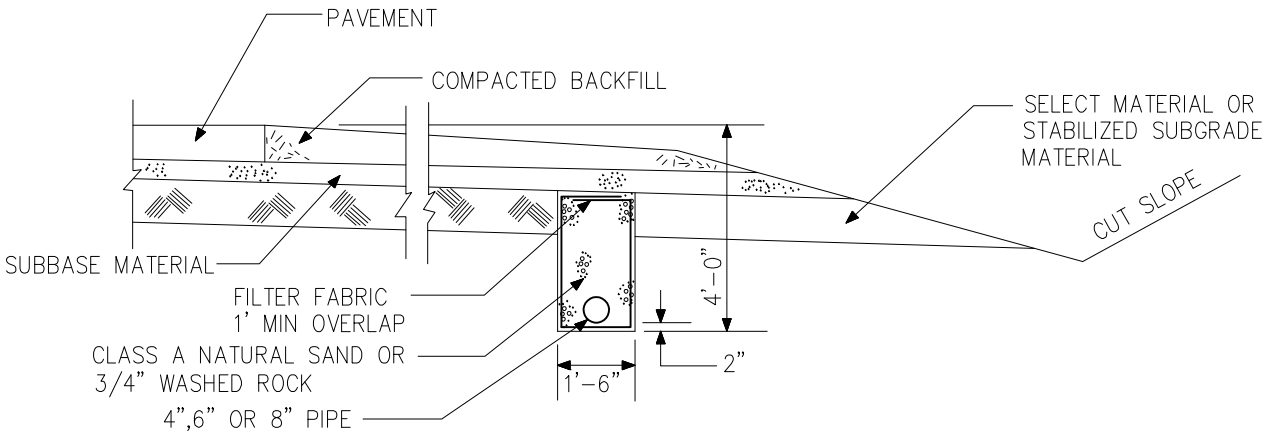
THICKENED EDGE



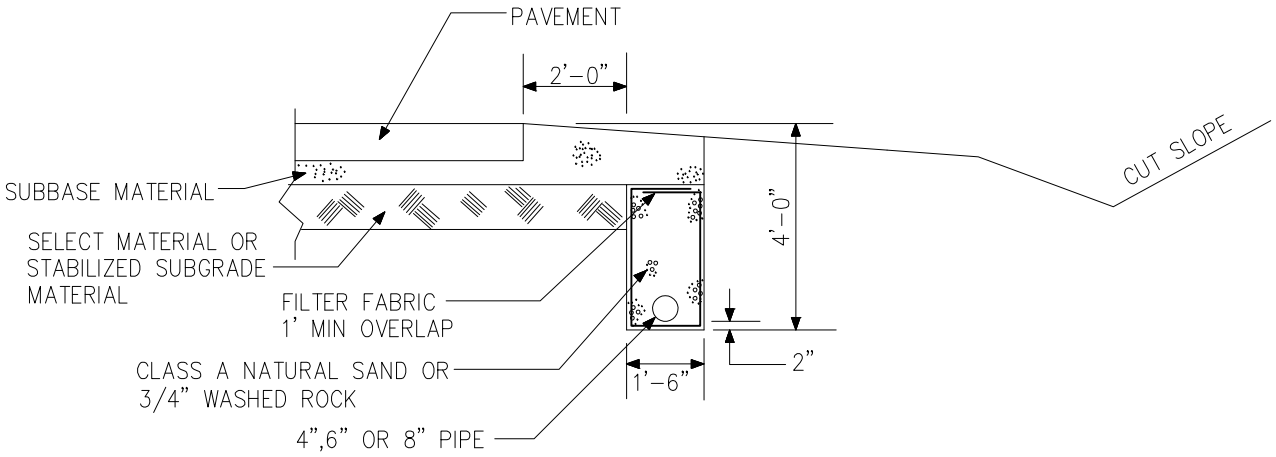
SECTION A–A

N.T.S.

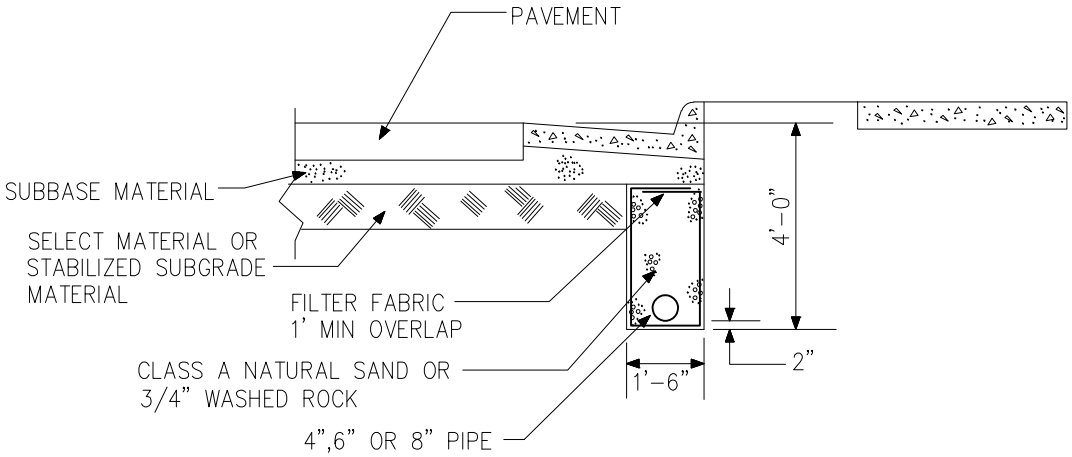
	STANDARDS & SPECIFICATIONS	REVISED:	CONCRETE BUS PAD
DATE:		DRAWING NO. 500–22	



SUBBASE MATERIAL CARRIED THROUGH SHOULDER



SUBBASE MATERIAL NOT CARRIED THROUGH SHOULDER

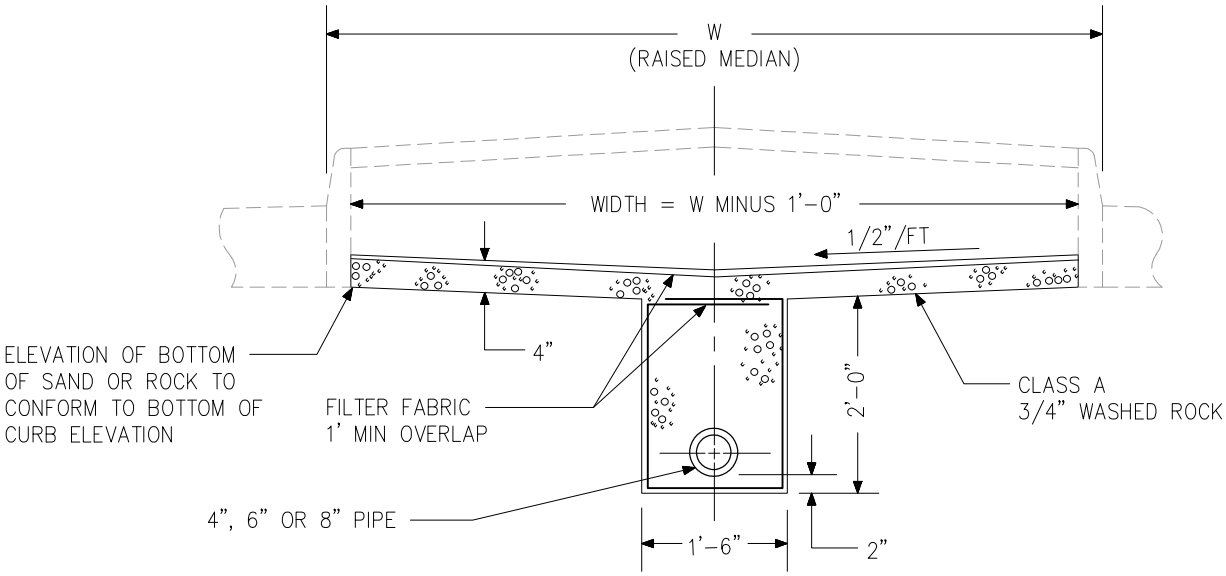


CURB AND GUTTER SECTION

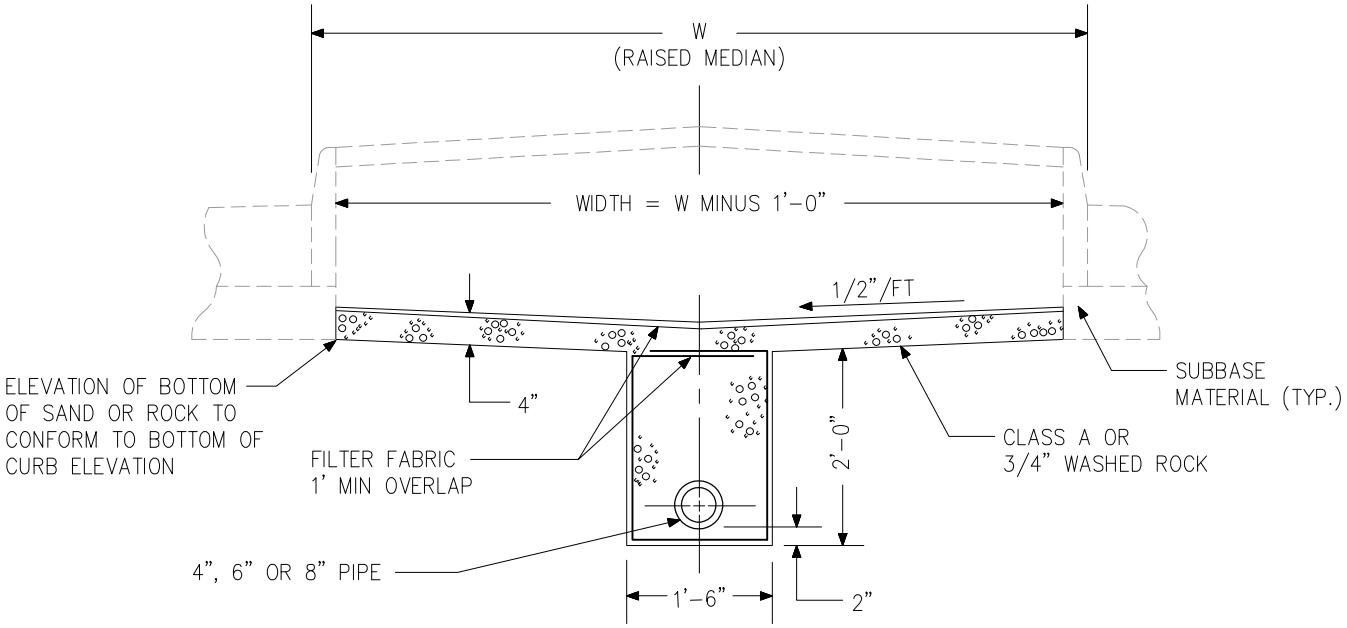
NOTE: WHERE THE BOTTOM OF SELECT MATERIAL IS GREATER THAN 4'-0" BELOW PAVEMENT, THE UNDERDRAIN PIPE IS TO BE COINCIDENT WITH THE BOTTOM OF SELECT MATERIAL, AND THE TRENCH DEPTH AND BACKFILL QUANTITY INCREASED ACCORDINGLY.

N.T.S.

	STANDARDS & SPECIFICATIONS	REVISED:
DATE:	DRAWING NO. 500-23	**STANDARD PIPE UNDERDRAINS**



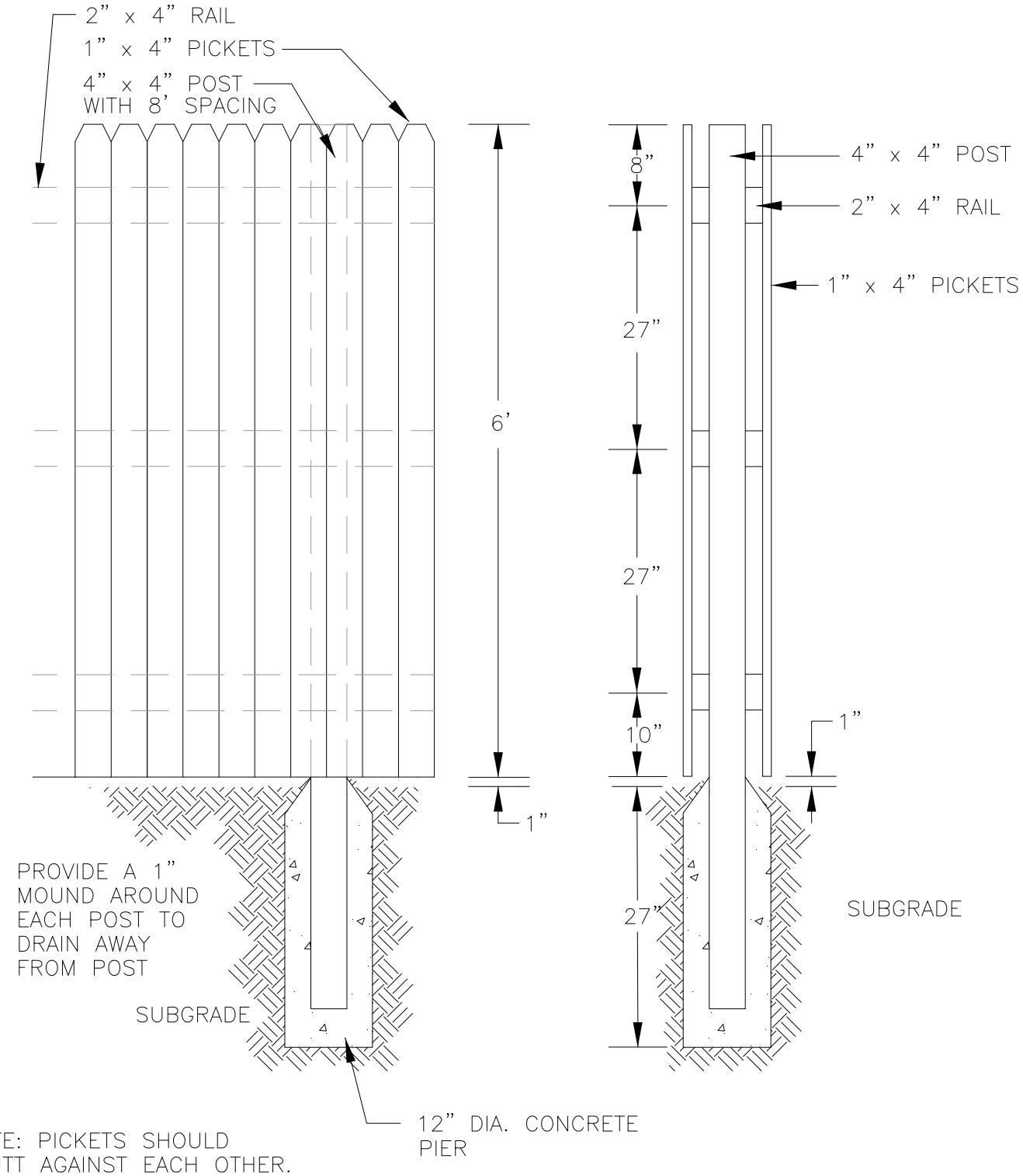
WITHOUT SUBSURFACE MATERIAL



WITH SUBSURFACE MATERIAL

N.T.S.

	STANDARDS & SPECIFICATIONS	REVISED:
DATE:	DRAWING NO. 500-24	PIPE UNDERDRAIN FOR RAISED IRRIGATED MEDIANS



NOTE: PICKETS SHOULD ABUTT AGAINST EACH OTHER.

FRONT VIEW

SIDE VIEW

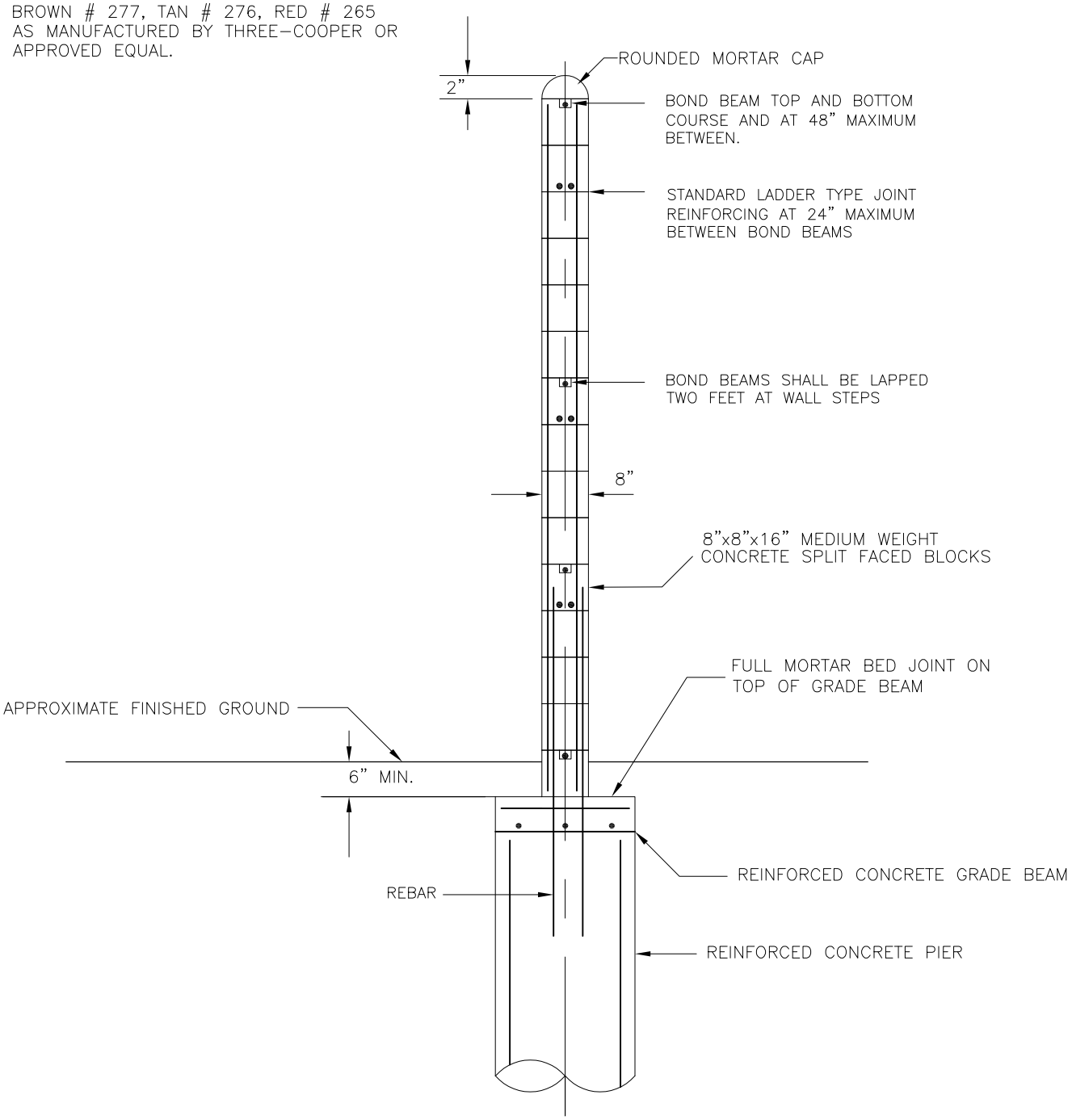
N.T.S.

	STANDARDS & SPECIFICATIONS	REVISED:	SOUND BARRIER FENCE
DATE:		DRAWING NO. 500–25	

NOTES:

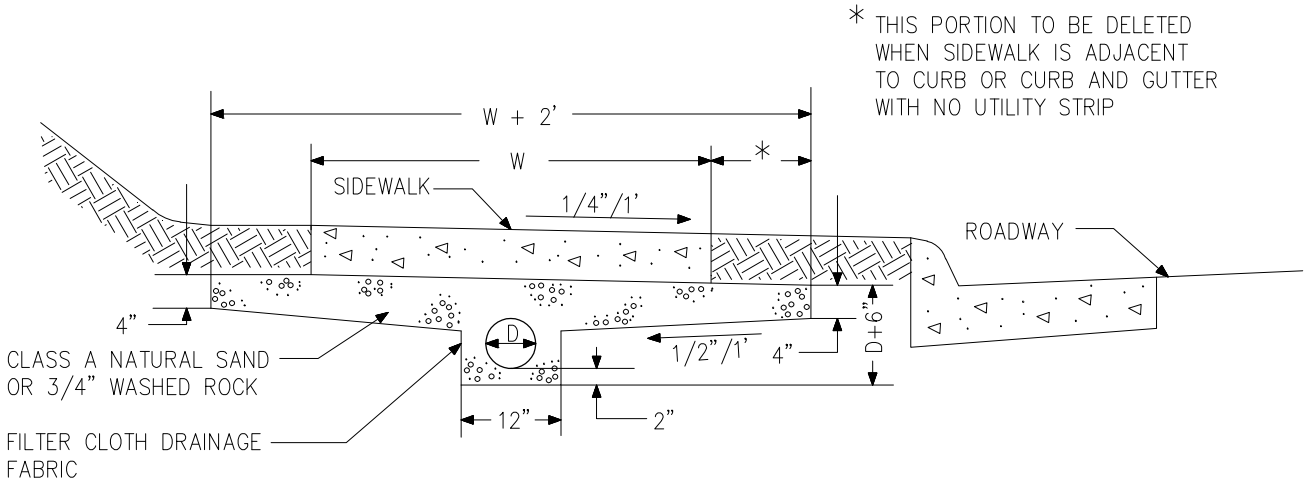
1) A STRUCTURAL ENGINEERING DESIGN FOR THE WALL AND FOUNDATION SHALL BE SUBMITTED TO THE CITY FOR APPROVAL.

2) COLORS FOR SPLIT CONCRETE BLOCKS SHALL BE LIMITED TO:
BROWN # 277, TAN # 276, RED # 265
AS MANUFACTURED BY THREE-COOPER OR APPROVED EQUAL.



N.T.S.

	STANDARDS & SPECIFICATIONS	REVISED:	CONCRETE BLOCK SOUND WALL
DATE:	DRAWING NO. 500-26		



D = ALL PIPE TO BE 6" UNLESS OTHERWISE NOTED. CORRUGATED PERFORATED PLASTIC PIPE OR ALTERNATE TYPES AS APPROVED BY CITY ENGINEER

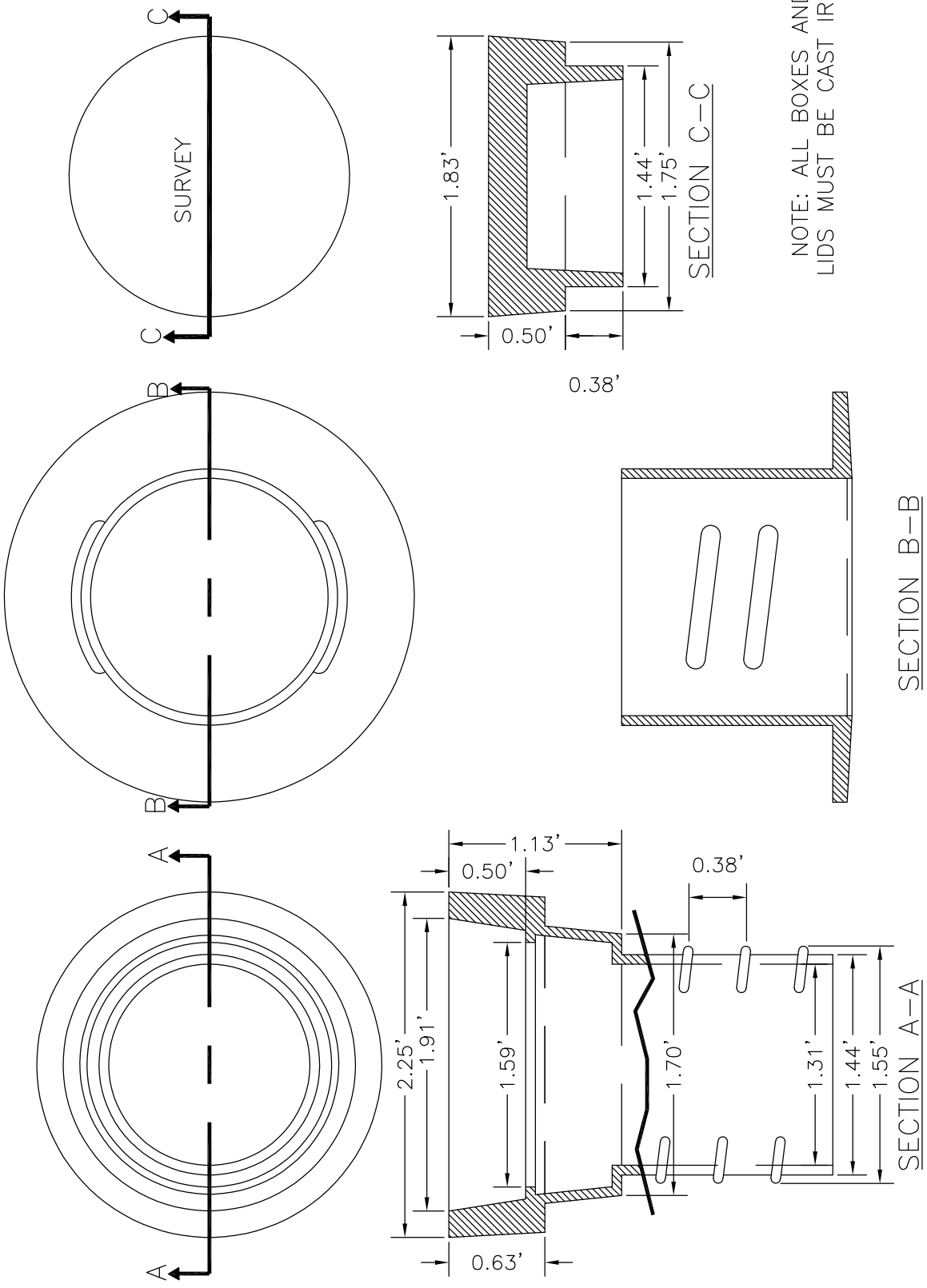
NOTE:

SIDEWALK UNDERDRAIN IS TO BE USED WHEN THE SIDEWALK LONGITUDINAL GRADIENT IS 3% OR MORE AND WHEN THE UNDERLYING SOIL HAS 34% OR MORE PASSING THE NO. 200 SIEVE AND HAS A PI OF 30 OR MORE.

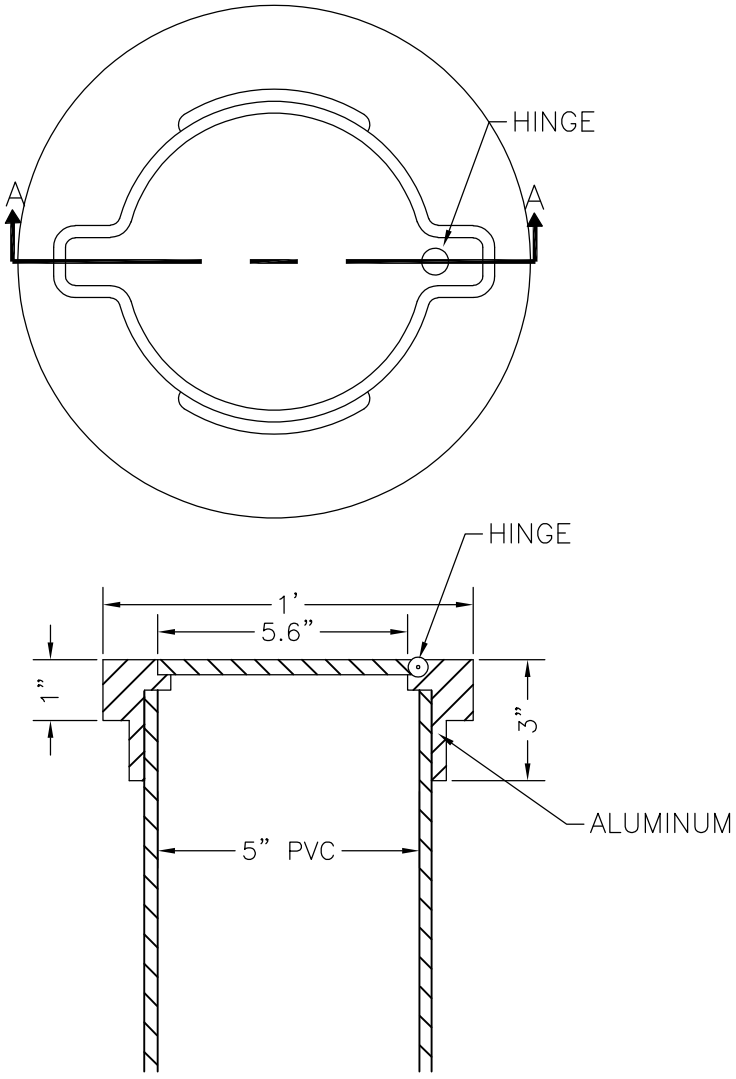
SIDEWALK UNDERDRAINS SHOULD BE TIED INTO THE STORM SEWER SYSTEM AT POINTS ABOUT A CITY BLOCK APART. UNDERDRAIN RUNS MUST NOT EXCEED 1,000 FEET IN LENGTH WITHOUT DISCHARGING INTO THE STORM DRAIN SYSTEM OR INTO AN OPEN DRAIN. THE LENGTH OF RUN MAY BE INCREASED UP TO AN ADDITIONAL 1,000 FEET IF 8" DIAMETER PIPE IS USED IN THE DOWNSTREAM 1,000 FEET SECTION OF THE RUN.

N.T.S.

	STANDARDS & SPECIFICATIONS	REVISED:	STANDARD SIDEWALK UNDERDRAIN
DATE:	DRAWING NO. 500–27		



	STANDARDS & SPECIFICATIONS	REVISED:	SCREW TYPE ADJUSTABLE MONUMENT BOX
DATE:		DRAWING NO. 500–28	



SECTION A–A

	STANDARDS & SPECIFICATIONS	REVISED:	HINGED TYPE ALUMINUM MONUMENT BOX
DATE:		DRAWING NO. 500–29	

DATE:

DRAWING NO. 500-30

REVISED:

STANDARDS & SPECIFICATIONS

SURVEY MONUMENTS

SHEET 1 OF 2

NOTE: IF PROJECT IS WITHIN ANOTHER JURISDICTION THAT JURISDICTION MAY BE USED IN PLACE OF ELBERT COUNTY

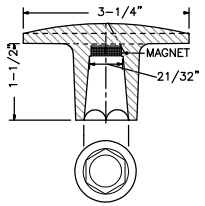
REFERENCE MONUMENT CAP

R O W MONUMENT CAP

CONTROL MONUMENT CAP

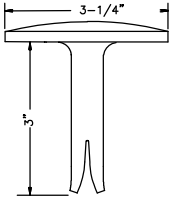
ALIQUOT CORNER MONUMENT CAP

NOTE: (A BLANK CAP MAY BE SUBSTITUTED IF THE APPROPRIATE ABOVE CAP IS NOT AVAILABLE. IF A BLANK CAP IS USED, ALL INFORMATION NORMALLY INCLUDED ON THE APPROPRIATE STANDARD CAP, SHALL BE STAMPED ON THE BLANK CAP ALONG WITH SPECIFIC PROJECT INFORMATION SUCH AS PROJECT NO., DATE, POINT NO., ETC..)



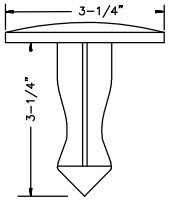
BRASS AND ALUMINUM CAPS

BRASS CAP USED WITH STAINLESS STEEL ROD. ALUMINUM CAP USED WITH ALUMINUM ROD. (THREADED CAP IS ALSO AVAILABLE)



ALUMINUM CAP

FOR PLACING IN EXISTING CONCRETE OR ROCK

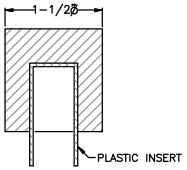


BRASS CAP

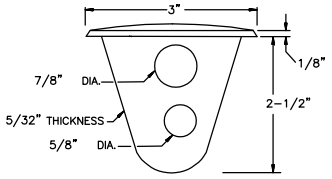
FOR PLACING IN EXISTING CONCRETE OR ROCK

MONUMENT APPLICATION

CAP TYPE	MONUMENT TYPE							
	1	1A	2	2A	3	3A	4	5
REFERENCE	X	X					X	
ROW	X	X						X
CONTROL		X	X	X			X	
ALIQUOT CORNER					X	X		
WITNESS POST (WHEN REQUIRED)	X	X	X	X	X			X



TEMPORARY ALUMINUM CAP



BRASS CAP

FOR PLACING IN NEW CONCRETE.

DIMENSIONS ARE INCHES (") UNLESS OTHERWISE NOTED.

TYPE 1 AND TYPE 1A ALUMINUM AND STAINLESS STEEL DRIVEN MONUMENTS

MONUMENTS ARE INSTALLED BY ATTACHING THE PROPER SIZE TIP TO ONE END OF A SECTION OF ROD AND A 3" LONG x 3/4" DIA. STAINLESS STEEL DRIVER TO THE OTHER END. DRIVER IS THEN PLACED OVER THE STAINLESS STEEL DRIVER FOR THE HAMMER TO CONTACT. WHEN ADDITIONAL SECTIONS OF ROD ARE NEEDED, THEY ARE TO BE ATTACHED USING A SET OF SELF-LOCKING WASHERS. RODS ARE STOCKED IN TWO-FOOT AND THREE-FOOT SECTIONS. ONE FOOT SECTIONS MAY BE OBTAINED BY CUTTING A TWO-FOOT SECTION IN HALF. THE ROD SECTION IS DRIVEN BY USING THE PROPER HAMMER WITH A SOFT FACE OR BY USING A POWER ADAPTER WITH A GASOLINE-POWERED DRIVER.

TYPE 1 MONUMENTS TYPICALLY USE A THREE-FOOT SECTION OF ROD. WHEN SUBSURFACE ROCK OR CONCRETE IS ENCOUNTERED LESS THAN THREE-FEET BELOW THE GROUND SURFACE, THE ROD SHALL BE EMBEDDED IN THE ROCK OR CONCRETE AT LEAST 6" WITH A GROUT MATERIAL. THE ROD MAY BE SHORTENED TO ACCOMMODATE THE CONDITIONS.

TYPE 1A MONUMENTS SHALL BE DRIVEN TO REFUSAL BY THREADING ADDITIONAL SECTIONS ONTO THE FIRST SECTION. ADDED SECTIONS REQUIRE A SET OF LOCK WASHERS. REFUSAL IS DEFINED AS ONE INCH OF MOVEMENT WITH FOUR HEAVY BLOWS OF A 12 LB. HAMMER. A DRIVEN CAP IS NECESSARY (VS. A THREADED CAP) WHEN A CUT ROD IS USED. A SOFT FACED HAMMER IS REQUIRED TO SEAT THE DRIVEN CAP ONTO THE ROD.

TYPE 2 AND TYPE 2A ALUMINUM FINNED ROD MONUMENTS

A TYPE 2 MONUMENT IS USED FOR HORIZONTAL CONTROL MONUMENTS WHERE LOOSE MATERIAL IS ENCOUNTERED. THE LARGER SIZE TIP IS TO BE USED ON ONE END OF THE THREE-FOOT ROD AND THE FINS ON THE OPPOSITE END OF THE THREE – FOOT ROD ARE TO BE BENT OVER TO ACCOMMODATE THE CAP. IF MORE VERTICAL STABILITY IS REQUIRED FOR USE AS A VERTICAL CONTROL MONUMENT, THE ADDED SECTIONS WHICH ARE NOT FINNED, SHOULD BE DRIVEN FIRST. THE NUMBER OF SECTIONS TO BE ADDED WILL VARY WITH NEEDS AND TYPE OF SOIL.

THE TYPE 1A MONUMENT NOTE ABOVE ALSO APPLIES TO THE TYPE 2A MONUMENT.

TYPE 3 AND TYPE 3A ALUMINUM PIPE MONUMENTS

THIS MONUMENT IS USED TO MONUMENT AN ALIQUOT CORNER. THE INSTALLATION OF THIS MONUMENT AND RECORD FILING SHALL BE DONE IN ACCORDANCE WITH THE COLORADO REVISED STATUTES, TITLE 38, ARTICLES 50 AND 51. ALSO REFER TO THE CDOT SURVEY MANUAL. THE LAND SURVEYOR'S LICENSE NUMBER AND THE YEAR SHALL BE STAMPED ON THE CAP.

TYPE 4 BRASS CAP MONUMENT

THIS MONUMENT IS PLACED IN CONCRETE, SUCH AS BRIDGE SUPER STRUCTURE CONCRETE. IT IS PLACED ABOVE A FOOTING SUPPORT OVER THE ABUTMENT OR OVER A PIER. AN ALTERNATIVE PLACEMENT IS VERTICALLY IN THE ABUTMENT WALL OR PIER IF ONLY AN ELEVATION REFERENCE IS DESIRED AND IT IS POSSIBLE TO LEAVE ACCESS FOR AN ELEVATION ROD.

TYPE 5 BRASS CAP MONUMENT

THIS MONUMENT IS PLACED IN LOCATIONS WHERE A TYPE 1 OR TYPE 1A MONUMENT CANNOT BE PLACED. A COMMON APPLICATION IS IN A LARGE BOULDER WHERE A PROPERTY CORNER HAS BEEN PLACED. THIS MONUMENT COULD ALSO BE PLACED IN A SIDEWALK.

WITNESS POSTS

THE WITNESS POST, WHEN REQUIRED, WILL BE SUPPLIED BY THE DIVISION AND INSTALLATION SHALL BE INCLUDED IN THE WORK. IT SHALL BE DRIVEN WITHIN 10 FEET OF THE MONUMENT, WHEN POSSIBLE. A DELINEATOR POST WITH A 6" x 10" METAL SIGN PANEL MAY BE USED IN LIEU OF THE PLASTIC POST. THIS POST SHALL CONFORM TO STANDARD S-612-1.

SELF-LOCKING WASHERS

A SET OF TWO WASHERS SHALL BE USED AT ROD JOINTS AND THREADED CAP JOINTS, BUT NOT AT TIP JOINTS.

TEMPORARY MONUMENTS

A TEMPORARY ALUMINUM CAP IS USED ON A NO. 5 REBAR.

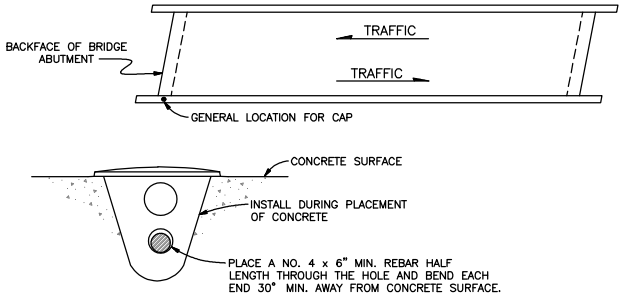
DATE:

DRAWING NO. 500-31

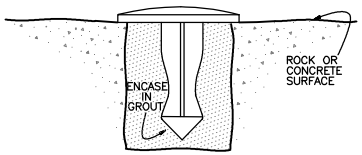
REVISED:

STANDARDS & SPECIFICATIONS

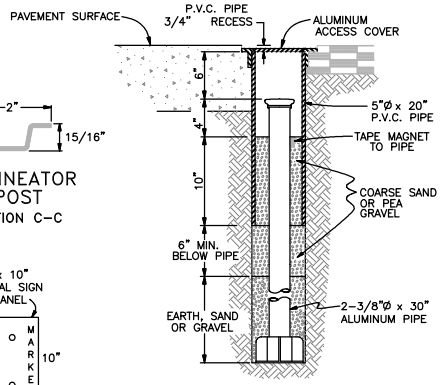
SURVEY MONUMENTS
SHEET 2 OF 2



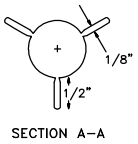
TYPE 4 MONUMENT



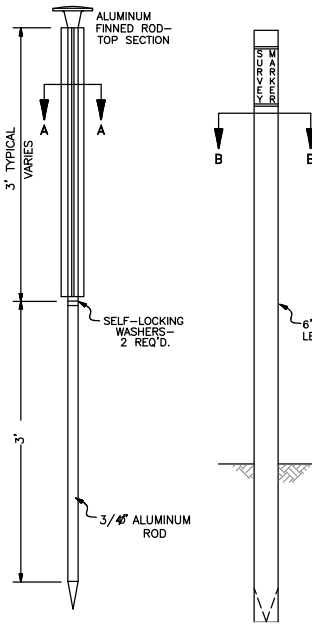
TYPE 5 MONUMENT



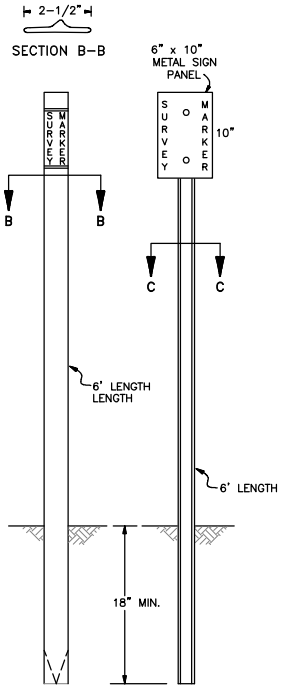
TYPE 3A MONUMENT,
ROADWAY INSTALLATION



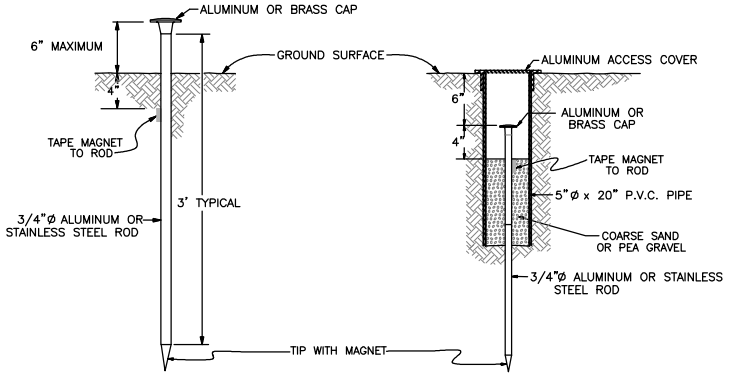
SECTION A-A



TYPE 2 MONUMENT

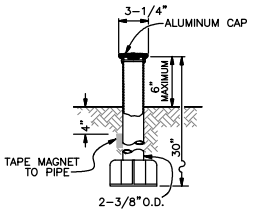


WITNESS POSTS



TYPE 1 MONUMENT

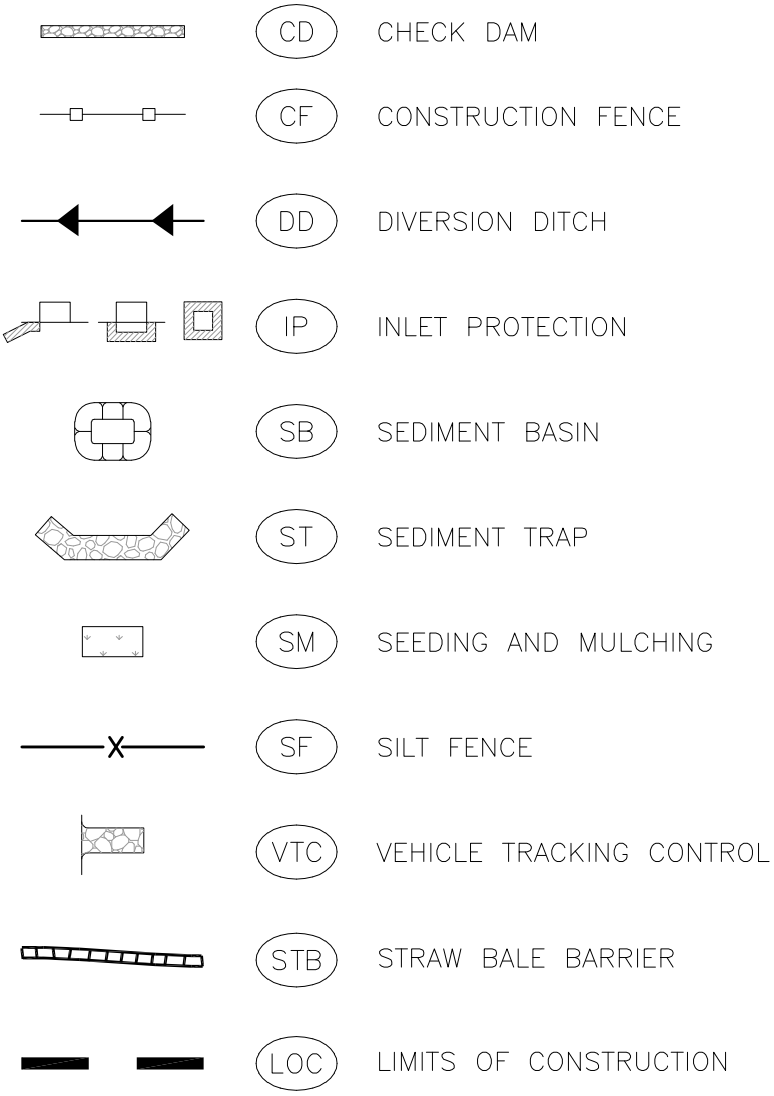
TYPE 1A MONUMENT & TYPE 2A MONUMENT
INCLUDES MONUMENT BOX



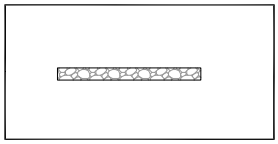
TYPE 3 MONUMENT

DIMENSIONS ARE INCHES (") UNLESS OTHERWISE NOTED.

BMP LEGEND



	STANDARDS & SPECIFICATIONS	REVISED:	EROSION AND SEDIMENT CONTROL LEGEND
DATE:	DRAWING NO. 600-01		



CD

CHECK DAM

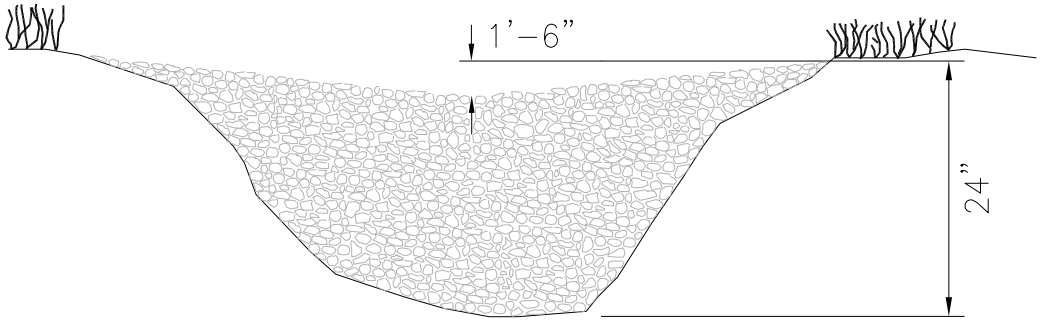
Definition

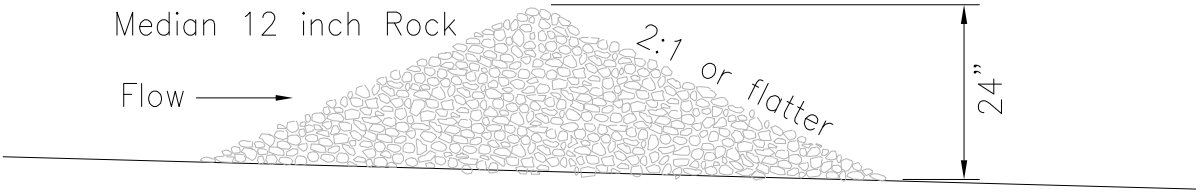
Small temporary dam constructed across a swale or drainage ditch.

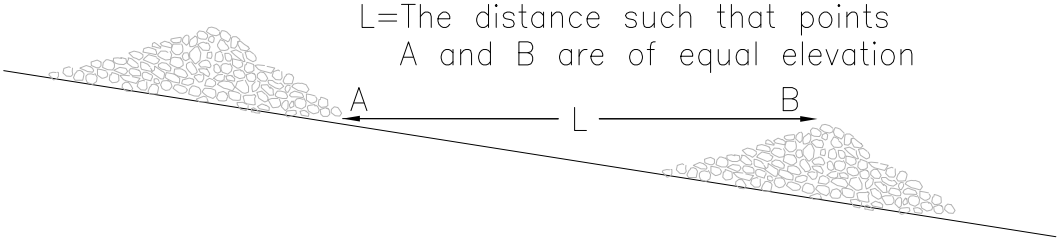
Purposes

To reduce the velocity of stormwater flows and erosion of the swale or ditch.

ROCK CHECK DAM







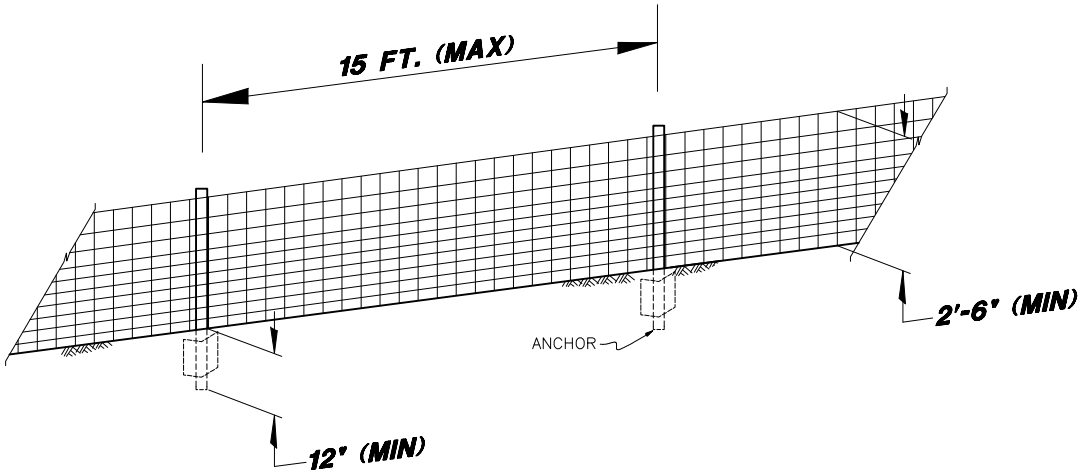
SPACING BETWEEN CHECK DAMS

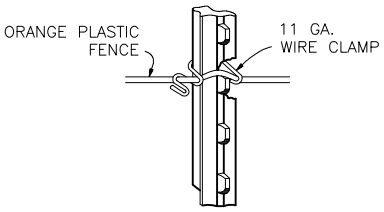
N.T.S.

	STANDARDS & SPECIFICATIONS	REVISED:	CHECK DAM DETAIL
DATE:	DRAWING NO. 600-02		

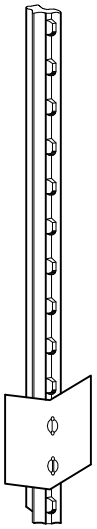
CF

CONSTRUCTION FENCE



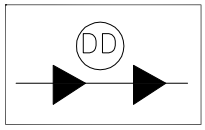


TIES FOR
"STUDDED TEE"



"STUDDED TEE"
LINE POST

	STANDARDS & SPECIFICATIONS	REVISED:	CONSTRUCTION FENCE
DATE:	DRAWING NO. 600–03		



DD

TEMPORARY DIVERSION DITCH

DEFINITION

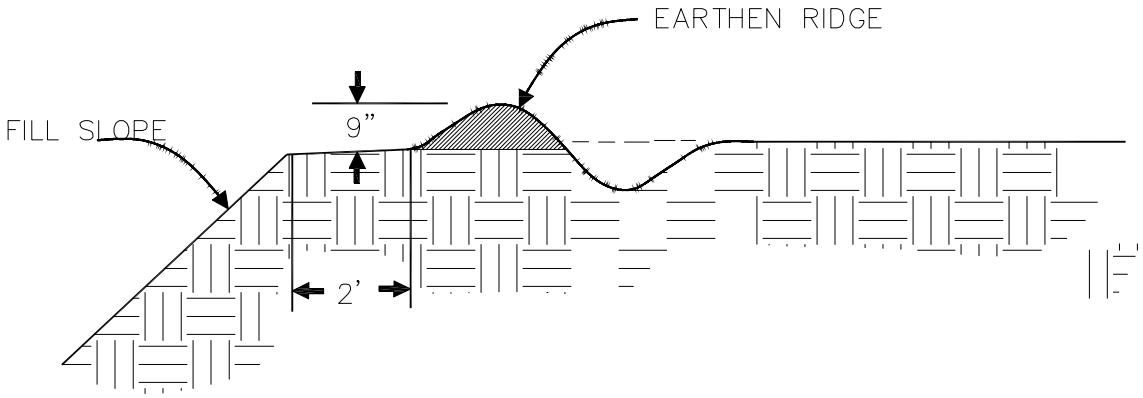
A TEMPORARY RIDGE OF COMPACTED SOIL LOCATED AT THE TOP, MIDSLOPE, OR BASE OF A DISTURBED AREA

PURPOSE

1. TO DIVERT STORM RUNOFF FROM HIGHER DRAINAGE AREAS AWAY FROM THE UNPROTECTED SLOPES TO A PERMANENT CHANNEL OR TEMPORARY CHANNEL DIVERSION.

2. TO DIVERT SEDIMENT–LADEN RUNOFF FROM THE MIDSLOPE OF A DISTURBED AREA TO A TEMPORARY SLOPE DRAIN.

3. TO DIVERT SEDIMENT–LADEN RUNOFF FROM THE BASE OF A DISTURBED AREA TO A SEDIMENT TRAPPING FACILITY.



9–1–99
URBAN DRAINAGE AND FLOOD CONTROL DISTRICT

	STANDARDS & SPECIFICATIONS	REVISED:	TEMPORARY DIVERSION DITCH
DATE:	DRAWING NO. 600–04		

INLET PROTECTION

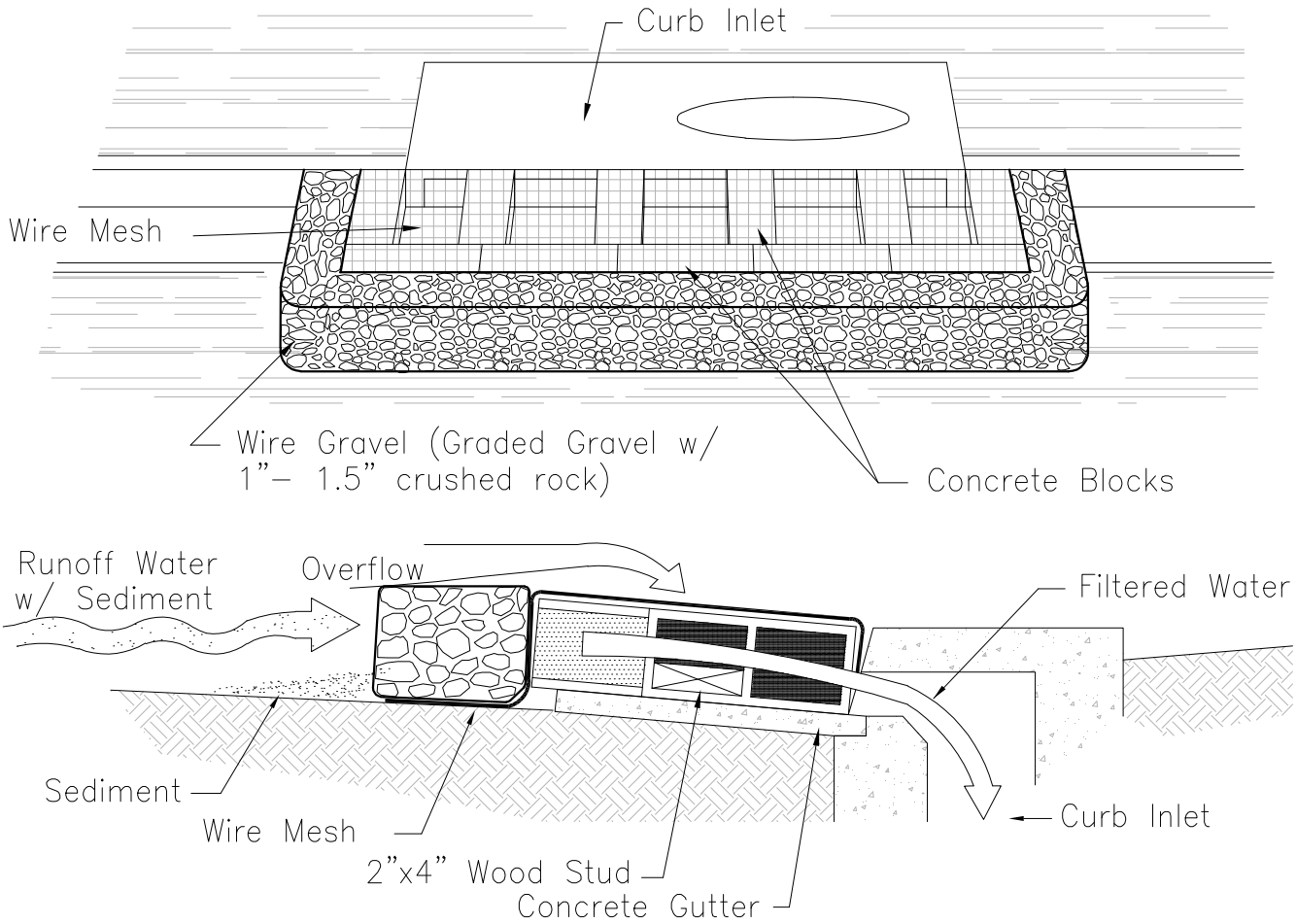
IP

Definition

A sediment filter or an excavated impounding area around a storm drain drop inlet or curb inlet.

Purposes

To reduce sediment from entering storm drainage systems prior to permanent stabilization of disturbed areas.



Special Application

This method of inlet protection is applicable where heavy concentrated flows are expected, but not where ponding around the structure might cause

	STANDARDS & SPECIFICATIONS	REVISED:	INLET PROTECTION DETAIL
DATE:		DRAWING NO. 600–05	

INLET PROTECTION

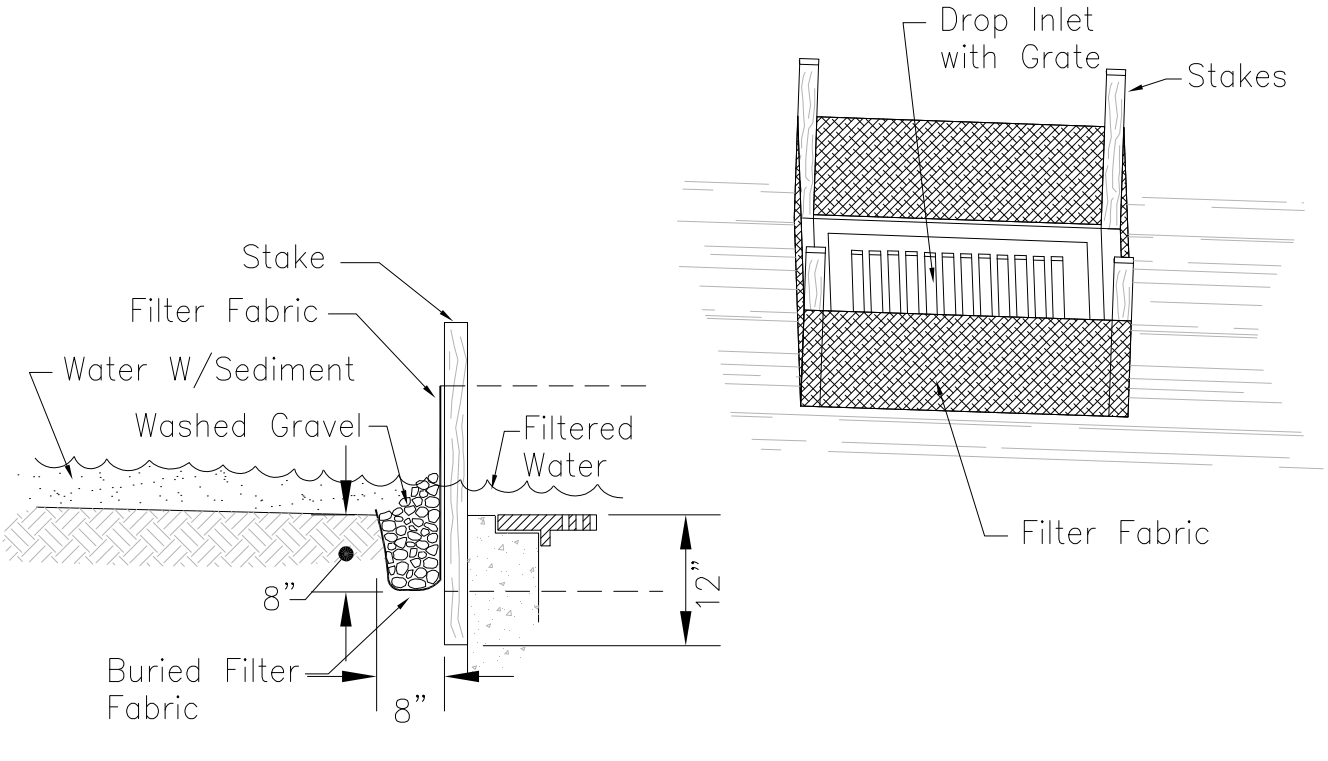
IP

Definition

A sediment filter or an excavated impounding area around a storm drain or curb inlet.

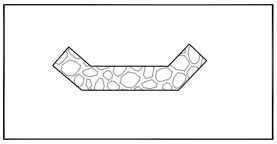
Purposes

To reduce sediment from entering storm drainage systems prior to permanent stabilization of disturbed area.



STORM DRAIN INLET PROTECTION

	STANDARDS & SPECIFICATIONS	REVISED:	INLET PROTECTION DETAIL
DATE:		DRAWING NO. 600–06	



ST

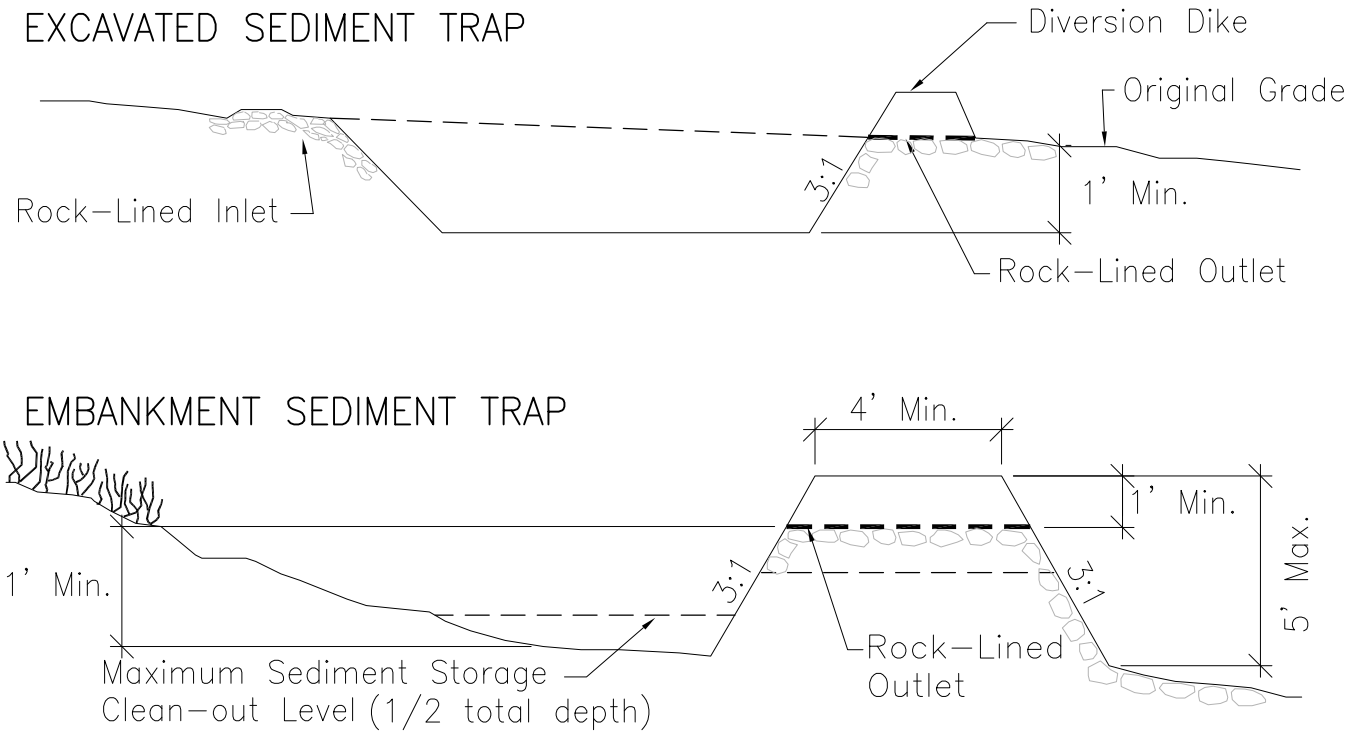
TEMPORARY SEDIMENT TRAP

Definition

A small temporary ponding area, formed by constructing an earthen embankment with a rock–covered outlet across a drainage swale, or by excavation of a depression below original grade. Relative elevations should contain all runoff within the trap area.

Purposes

To detain sediment–laden runoff from disturbed areas long enough to allow the majority of the sediment to settle out.



Rock Lining: 9" thick layer of 6" rock on 3" thick layer of 1/2"–3/4" filter

	STANDARDS & SPECIFICATIONS	REVISED:	TEMPORARY SEDIMENT TRAP
DATE:	DRAWING NO. 600–07		

SB

TEMPORARY SEDIMENT BASIN

DEFINITION

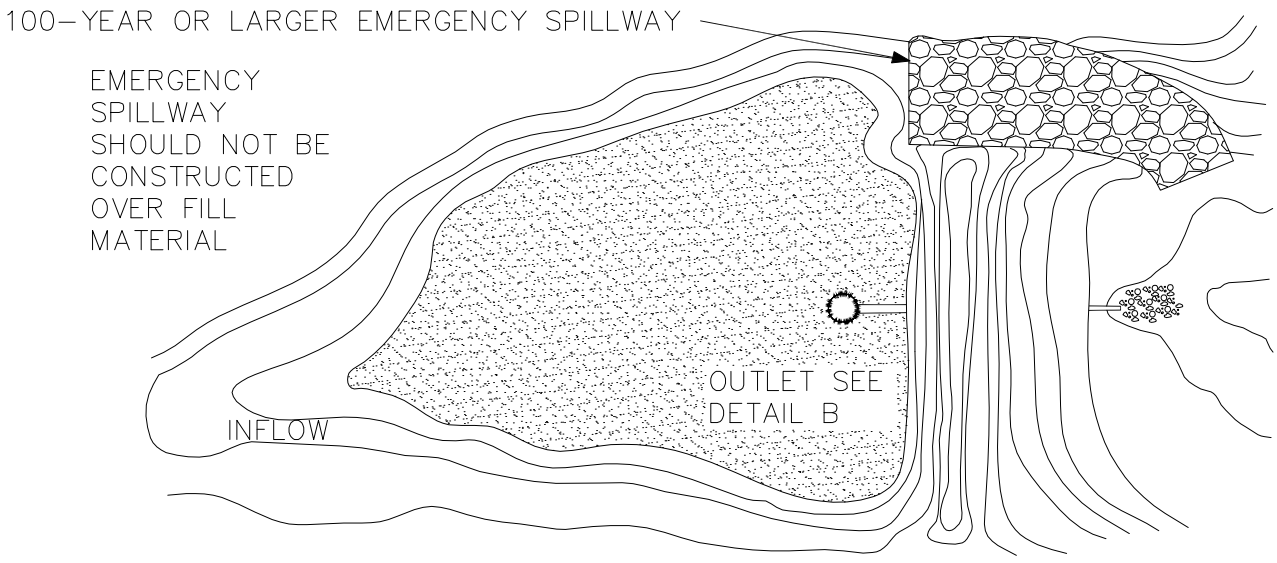
A TEMPORARY BASIN WITH A CONTROLLED STORM WATER RELEASE STRUCTURE, FORMED BY EXCAVATION OR CONSTRUCTION OF AN EMBANKMENT OF COMPACTED SOIL. REQUIRED FOR ALL DRAINAGE AREAS GREATER THAN 1 ACRE.

PURPOSE

TO DETAIN SEDIMENT–LADEN RUNOFF FROM DISTRIBUTED AREAS TO ALLOW THE MAJORITY OF THE SEDIMENT TO SETTLE OUT.

REQUIRED VOLUME TO CREST OF EMERGENCY SPILLWAY = 1800 CUBIC FEET PER ACRE OF DRAINAGE AREA. SHOULD BE CLEANED OUT PRIOR TO BECOMING HALF FULL.

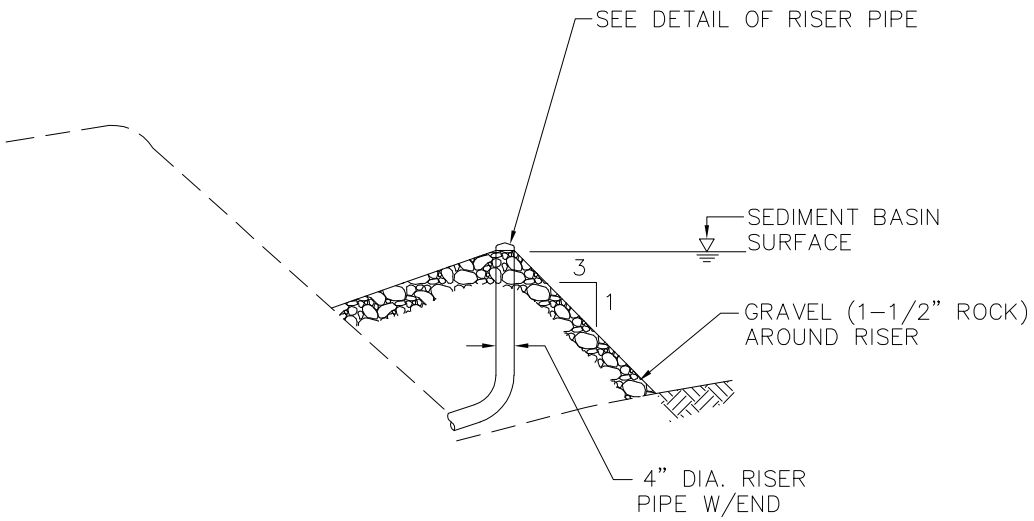
LIMITING GEOMETRY:
L/W GREATER THAN 2.0

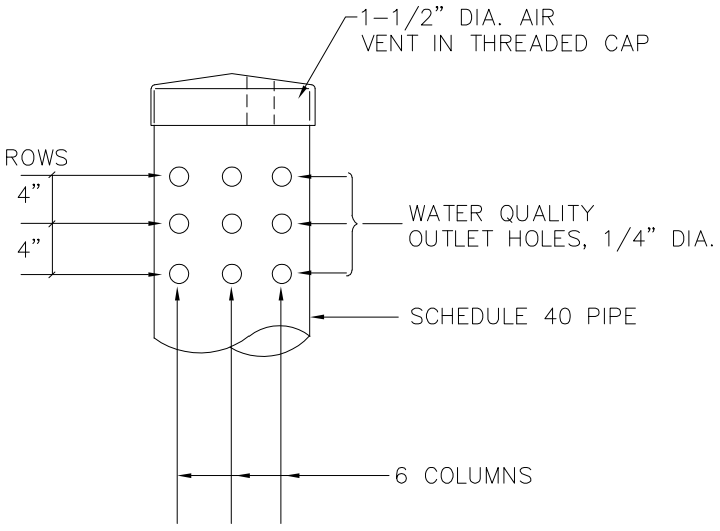


	STANDARDS & SPECIFICATIONS	REVISED:	TEMPORARY SEDIMENT BASIN
DATE:	DRAWING NO. 600–08		

SB

TEMPORARY SEDIMENT BASIN OUTLET DETAIL B





RISER PIPE DETAIL

	STANDARDS & SPECIFICATIONS	REVISED:	TEMPORARY SEDIMENT BASIN OUTLET
DATE:	DRAWING NO. 600–09		

SEEDING AND MULCHING INSTALLATION NOTES

1. All brands furnished shall be free from such noxious seeds as Russian or Canadian thistle, course fescue, European bindweed, Johnson grass, Knap weed, and leafy spurge.

2. The seeder shall furnish to the Contractor a signed statement certifying that the seed furnished is from a lot that has been tested by a recognized laboratory. Seed that has become wet, moldy, or otherwise damaged in transit or in storage, will not be acceptable. Seed tickets shall be provided to the Engineer upon request.

3. Drill seeding mix shall conform to the seed mix table.

4. If the seed available on the market does not meet the minimum purity and germination percentages specified, the subcontractor must compensate for a lesser percentage of purity or germination by furnishing sufficient additional seed to equal the specified product. The tags from the seed mixes must be supplied to contractor and forwarded to the Engineer.

5. The formula used for determining the quantity of pure live seed (PLS) shall be (pounds of seed) X (purity) X (germination) = pounds of pure live seed (PLS).

6. Perminate seed mix shall be used unless otherwise approved by the Engineer.

7. All areas to be seeded and mulched shall have native topsoil or approved soil amendments spread to a depth of at least 6 inches (loose depth). Haul roads and other compacted areas shall be loosened to a depth of 6 inches prior to spreading topsoil.

8. Soil is to be thoroughly loosened (tilled) to a depth of at least 6 inches prior to seeding. The top 6 inches of the seed bed shall be free of rocks greater than 4 inches and soil clods greater than 2 inches. Seeding over any compacted areas that haven't been thoroughly loosened shall be rejected.

9. Seed is to be applied using a mechanical drill to a depth of 1/4 inch. Row spacing shall be no more than 6 inches. Material used for mulch shall consist of long-stemmed straw. At least 50 percent of the mulch, by weight, shall be 10 inches or more in length. Mulch shall be applied and mechanically anchored to a depth of at least 2 inches. Mulch shall be applied at a rate of 4000 Lb. of straw per acre.

10. If the permittee demonstrates to the Engineer that it is not possible to drill seed, seed is to be uniformly broadcast at two times the drilled rate, then lightly harrowed to provide a deed depth of approximately 1/4 inch, then rolled to compact, then mulched as specified above.

11. Seeding and mulching shall be completed within 30 days of initial exposure or 7 days after grading is substantially complete in a given area (as defined by the Engineer). This may require multiple mobilizations for seeding and mulching.

12. Mulch shall be applied within 24-hours of seeding.

13. Tackifier should be utilized to help with straw displacement.

	STANDARDS & SPECIFICATIONS	REVISED:	EROSION AND SEDIMENT SEED AND MULCHING
DATE:	DRAWING NO. 600-10		

DRILL SEEDING MIX

1. Seed shall be drilled only (no hydroseed).

2. Seed type and amount of pure live seed (PLS) required per acre shall be:

NATIVE AREA SEED MIX

SEED NAME	BOTANIC NAME	% IN MIX	POUNDS OF PLS PER ACRE
Slender Wheatgrass	Agropyron Trachycaulum	0%	3 lbs.
Mountain Brome	Bromus Marginatus	0%	3 lbs.
Indian Ricegrass	Oryzopsis Hymenoides	0%	2 lbs.
Thickspike Wheatgrass	Agropyron Dasystachyum	0%	2 lbs.
Western Wheatgrass	Agropyron Smithii	0%	2 lbs.
Arizona Fescue	Festuca Arizonica	0%	2 lbs.
Sandburg Bluegrass	Poa Sandbergii	0%	0.5 lbs.
Rocky Mountain Penstemon	Penstemon Strictus	0%	0.5 lbs.
Blue Flax	Linium Lewsii	0%	0.5 lbs.
Mountain Lupine	Lupinus Alpestris	0%	1 lbs.
Lance-leaved Coreopsis	Coreopsis Lanceolata	0%	0.5 lbs.
Rubber Rabbitbrush	Chysothanus Nauseosus	0%	0.5 lbs.
Fringed Sagebrush	Artemisia Frigida	0%	0.3 lbs.
Prairie Sage	Artemesia Ludoviciana	0%	0.2 lbs.
		TOTAL	22.5 lbs.

SWALES/DRAINAGE AREA SEED MIX

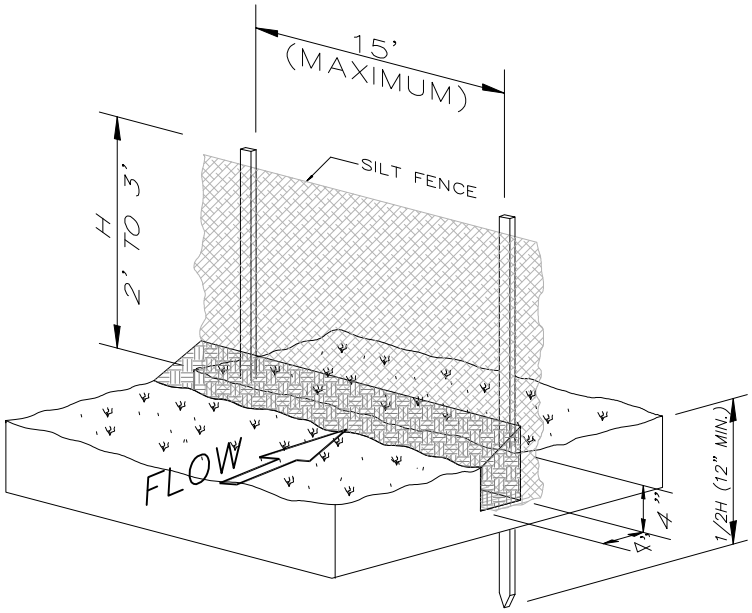
SEED NAME	BOTANIC NAME	% IN MIX	POUNDS OF PLS PER ACRE
Streambank Wheatgrass	Agropyron Riparium	0%	4 lbs.
Thickspike Wheatgrass	Agropyron Dasystachyum	0%	7 lbs.
Mountain Brome	Bromus Marginatus	0%	3 lbs.
Western Wheatgrass	Agropyron Smithii	0%	3 lbs.
Tufted Hairgrass	Deschampsia Caespitosa	0%	2 lbs.
Nuttall Alkaligrass	Puccinellia Airoides	0%	0.5 lbs.
Western Yarrow	Achillea Lanulosa	0%	0.5 lbs.
New England Aster	Aster Novae-angliae	0%	0.5 lbs.
Rocky Mountain Iris	Iris Missouriensis	0%	0.5 lbs.
		TOTAL	21.0 lbs.

	STANDARDS & SPECIFICATIONS	REVISED:	SEED MIX
DATE:	DRAWING NO. 600-11		

—x—

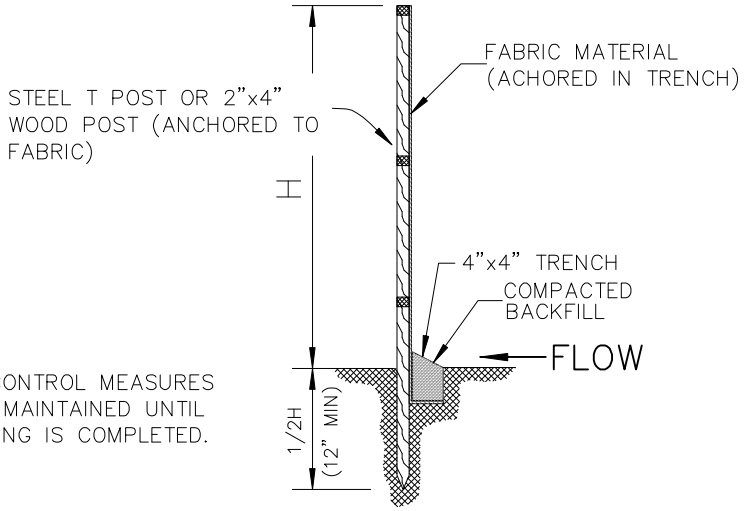
SF

SILT FENCE EROSION BARRIER



SILT FENCE INSTALLATION

-NTS-



NOTE: EROSION CONTROL MEASURES SHALL BE MAINTAINED UNTIL LANDSCAPING IS COMPLETED.

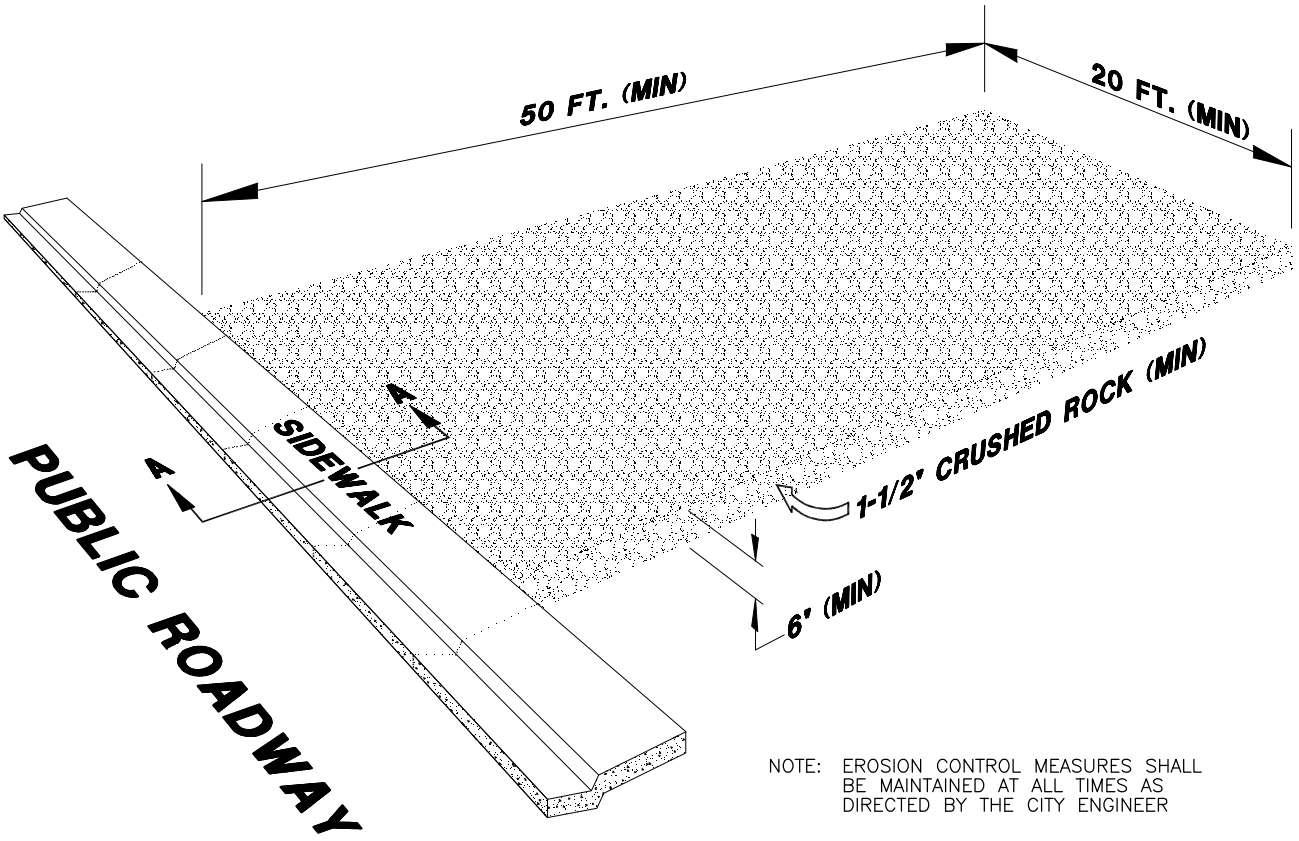
SECTION

-NTS-

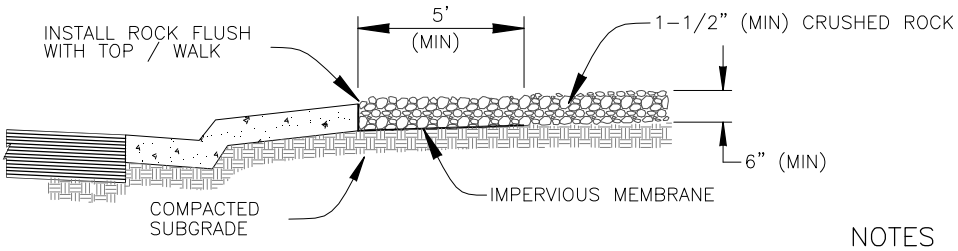
	STANDARDS & SPECIFICATIONS	REVISED:	SILT FENCE EROSION BARRIER
DATE:	DRAWING NO. 600—12		

VTC

VEHICLE TRACKING CONTROL



NOTE: EROSION CONTROL MEASURES SHALL BE MAINTAINED AT ALL TIMES AS DIRECTED BY THE CITY ENGINEER



SECTION A–A

-NTS-

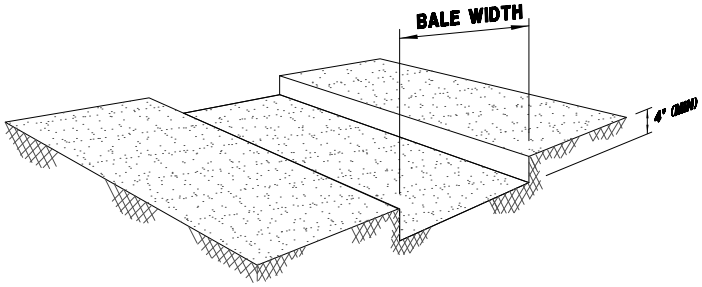
NOTES

1. ALL ROCK TO BE REMOVED UPON COMPLETION OF CONSTRUCTION.
2. PUBLIC ROADWAY TO BE KEPT CLEAN AND FREE OF MUD, DIRT AND DEBRIS AT ALL TIMES.

	STANDARDS & SPECIFICATIONS	REVISED:	VEHICLE TRACKING CONTROL
DATE:	DRAWING NO. 600–13		

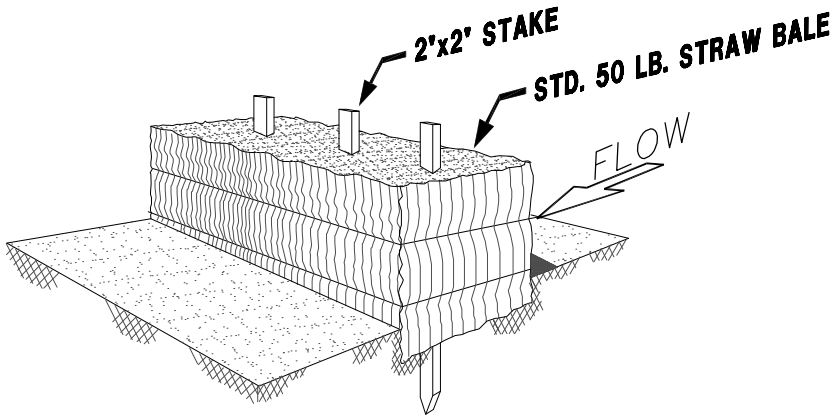
STB

STRAW BALE EROSION BARRIER



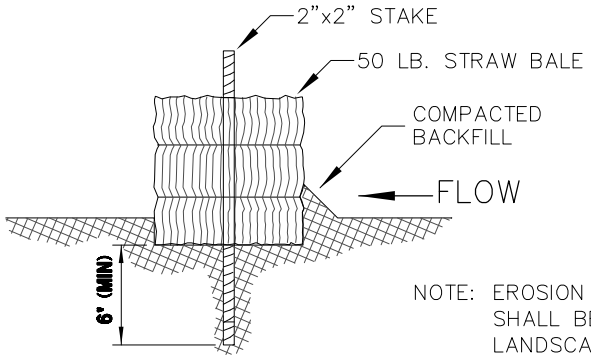
TRENCH EXCAVATION

-NTS-



STRAW BALE INSTALLATION

-NTS-

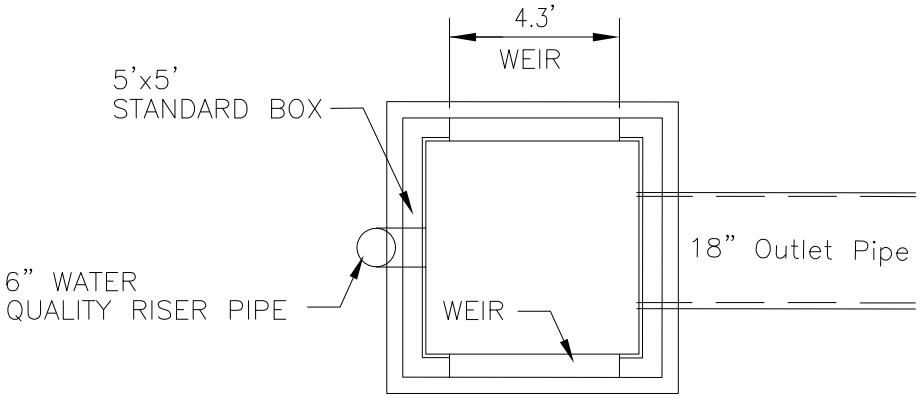


NOTE: EROSION CONTROL MEASURES SHALL BE MAINTAINED UNTIL LANDSCAPING IS COMPLETED.

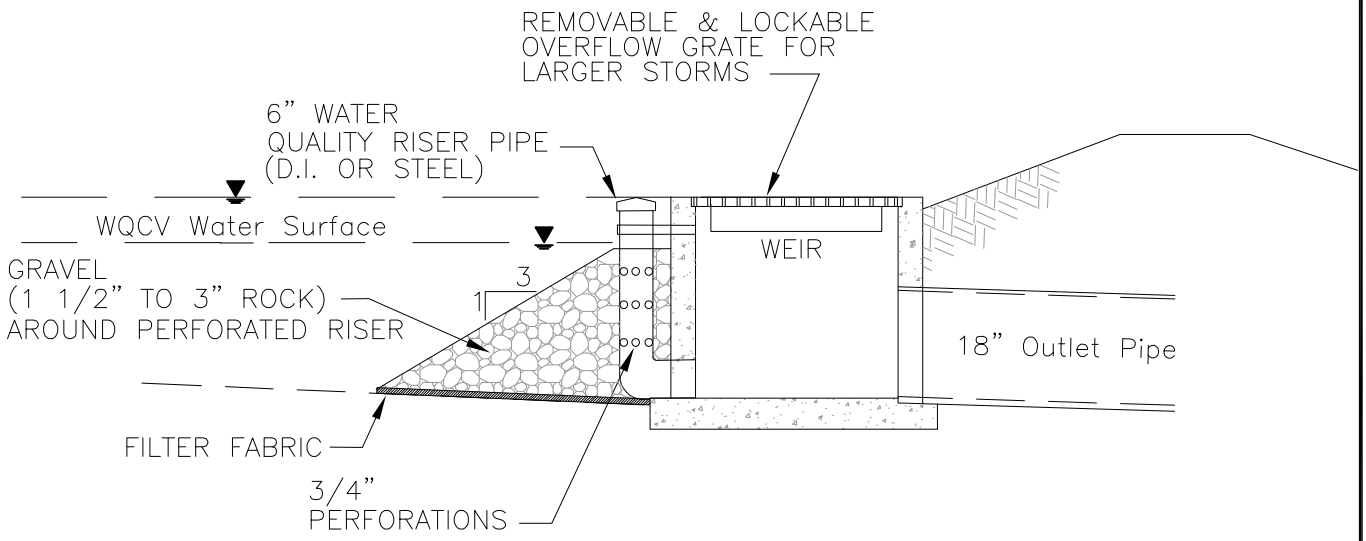
SECTION

-NTS-

	STANDARDS & SPECIFICATIONS	REVISED:	STRAW BALE EROSION BARRIER
DATE:		DRAWING NO. 600–14	



PLAN



PROFILE

OUTLET STRUCTURE

	STANDARDS & SPECIFICATIONS	REVISED:	OUTLET STRUCTURE
DATE:	DRAWING NO. 600–15		